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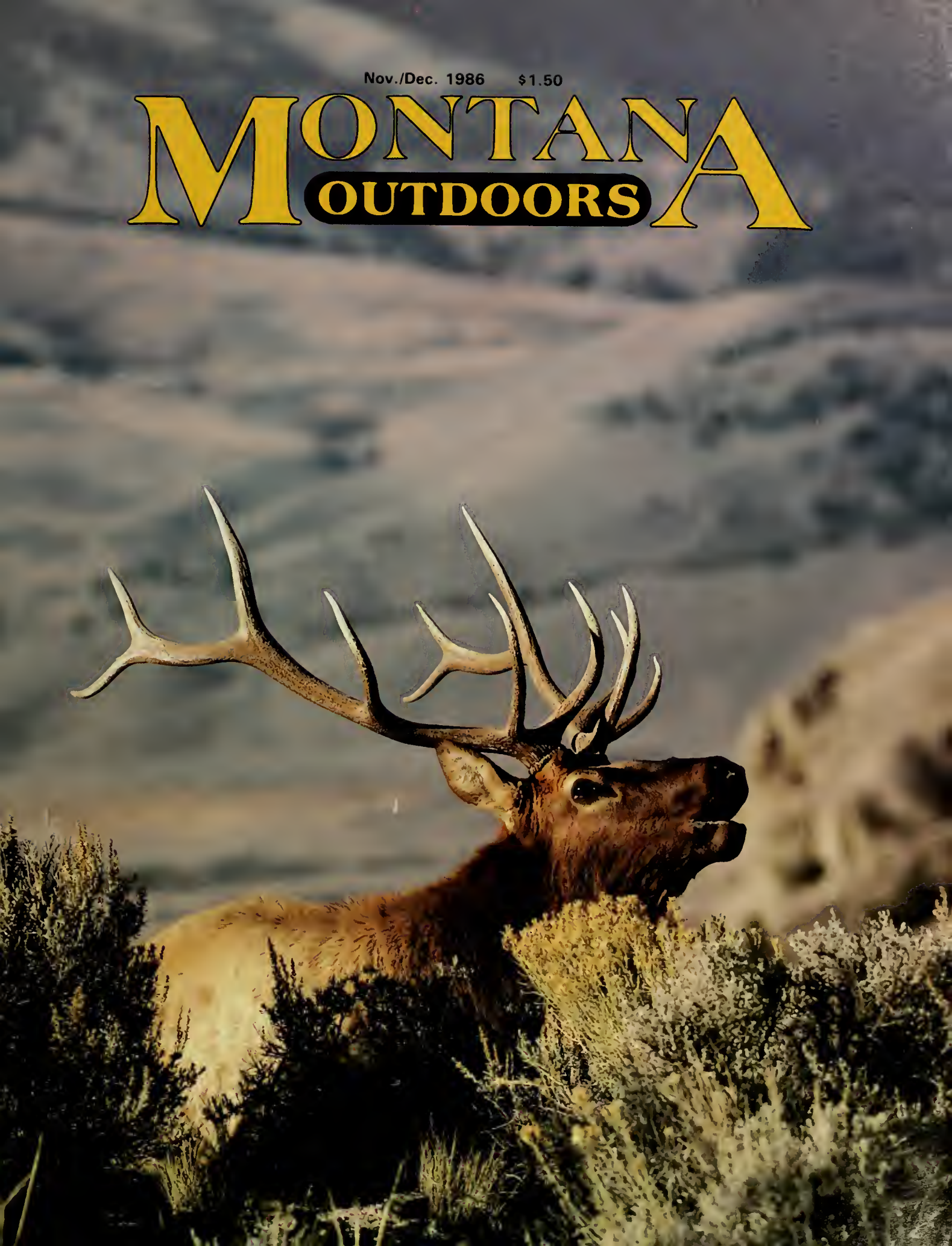
MONTANA OUTDOORS



JOHN W. WARDEN

DON'T DUCK THE ISSUE
Dive Right In

Coming in January
The Sixth Annual Special Photo Issue

see page 35

MONTANA OUTDOORS

November/December 1986
Volume 17, Number 6

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Over the last 25 years, the number of elk hunters in Montana has increased more than 30%; Michael H. Francis' front cover photo shows you why. John W. Warden's mallard drake on the inside front cover is merely a preview of a coming attraction: the Sixth Annual Special Photo Issue. And Mike Gurnett's back cover photo of a snowy owl is another sort of preview: a foreshadowing of winter.

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Ninepipe Wildlife Management Area

Dedicated to Wildlife

by Mike Aderhold

Montana's wildlife management areas (WMAs) are lands and waters controlled by the Department of Fish, Wildlife and Parks (DFWP) where the first consideration is the long-term well-being of wildlife.

There are 47 WMAs in 29 counties throughout Montana. They range in size from the small, donated two-acre Silver Gate site near the northeastern entrance of Yellowstone National Park, to the 54,137-acre Mount Haggin property south of Anaconda.

In all, the WMAs cover about 281,087 acres or slightly less than one-third of 1% of Montana. Two-thirds of the acreage (187,994 acres) is actually "owned" by the DFWP; the rest (93,093 acres) is leased from the federal government, large corporations, the State Land Board, or private individuals. Some areas adjacent to WMAs are managed primarily for wildlife by other agencies such as the U.S. Fish and Wildlife Service, U.S. Forest Service, Bureau of Land Management, or National Park Service and operated under various cooperative agreements with the DFWP.

Wildlife management areas constitute 83% of the property owned, leased, or otherwise controlled by the DFWP. The other 17% includes state park and recreation areas, state monuments, fishing access sites, fish hatcheries and spawning stations, and some conservation easements. Most of these lands serve wildlife to some degree, but other objectives precede general wildlife considerations.

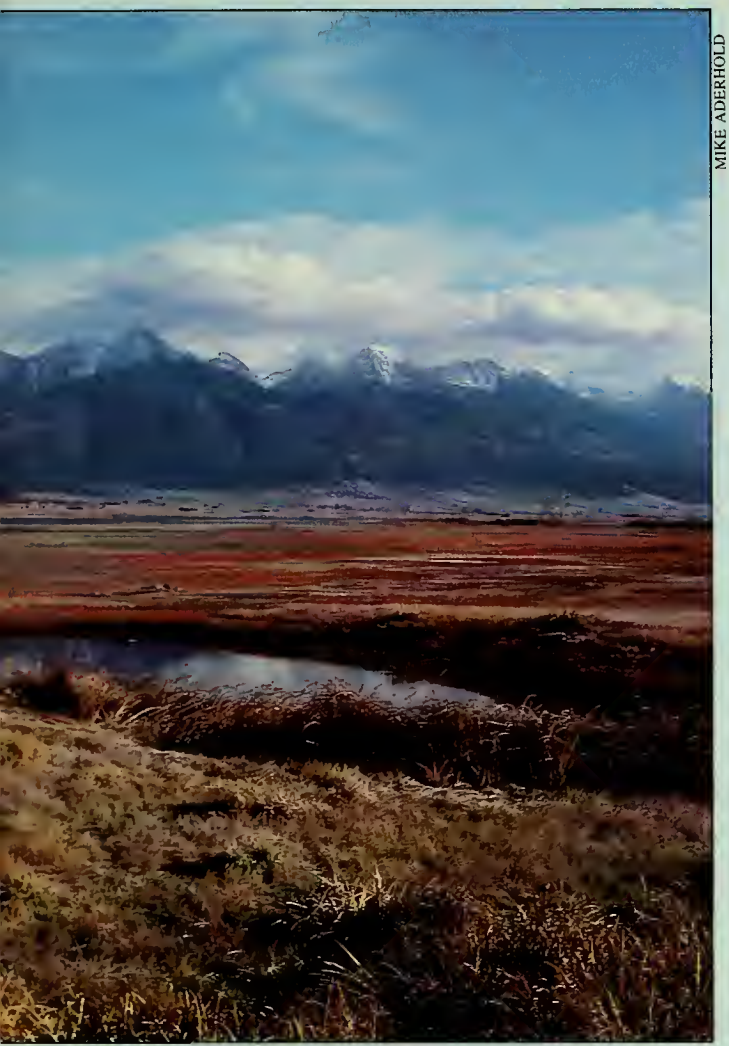
Some people confuse lands managed by the Department of State Lands with those managed by the DFWP. The 5.5 million acres controlled by the Department of State Lands is managed primarily to generate revenue for the School Trust Fund. While wildlife on this land is sometimes a consideration, it is not the top priority. The Department of State Lands manages some School Trust lands with unusually high wildlife values cooperatively with the DFWP; a few such sections are leased and are part of the WMA program. For the most part, however, the two agencies operate independently and under different mandates.

The present 47 WMAs were acquired in 255 transactions over the last 49 years. They involved proposals and negotiation by the DFWP with review and approval by the five-member Montana Fish and Game Commission. The money used in the program comes from those who buy hunting licenses and pay excise taxes on sporting arms and ammunition. The funds are appropriated by the Legislature specifically for land acquisition.

History, and Landmark Legislation

The history of Montana's wildlife management areas goes back to the drought, Depression, and all-time low big game populations of the 1930s. In 1932, Congress, to help finance massive relief programs, enacted a number of excise taxes, including one on sporting arms and ammunition. Originally, this money went into the general fund of the U.S. Treasury.

About the same time, the U.S. Senate set up a Special Committee on Conservation of Wildlife Resources to assess what role the federal government might play in turning the tide of wildlife habitat destruction. The next year, 1933, biologist Aldo Leopold published his classic textbook, "Game Management." This work summarized the basic principles of modern wildlife management, one of which is proper care of the land. In 1935, President Franklin Roosevelt, at the suggestion of critic, political cartoonist, and conservationist Jay N. "Ding" Darling, called for a national conference on fish and wildlife conservation.



MIKE ADERHOLD

MIKE ADERHOLD

Kootenai #3 Wildlife Management Area

In 1936, the first North American Wildlife Conference brought together leaders of the most prominent conservation organizations and representatives from more than 20 agencies concerned with wildlife resources and soil, water, and forest policy. Its proceedings, now a collector's item, brought together more information on the status of North American wildlife and the problems facing wildlife conservation than had ever been published in one volume before. Out of this meeting came a commitment to developing an active national wildlife policy.

This mix of events produced the most productive wildlife law ever enacted. In 1937, the Senate Special Committee on the Conservation of Wildlife Resources and a similar committee in the House both introduced a bill earmarking the excise tax on sporting arms and ammunition to state wildlife agencies for use in land acquisition, development, and research. The Federal Aid in Wildlife Restoration Act, or Pittman/Robertson Act (named for the two committee chairmen), became law Sept. 2, 1937.

This law created a special fund which currently earns revenue from an 11% federal excise tax on firearms, ammunition, and archery equipment, and a 10% tax on handguns. This fund is administered by the U.S. Fish and Wildlife Service. Most of the revenue is apportioned among the states by a formula based 50% on the number of hunting license holders in a state and 50% on the state's area. The formula has upper and lower limits: No state receives less than one-half of 1%, or more than 5%, of the amount annually available. Most of these federal allocations must be matched by state funds, with states providing at least 25%. One of the most farsighted features of the act was a requirement that each state must prohibit diversion of hunting license revenue for any purpose other than administration of a fish and wildlife program. All 50 states have enacted such laws. The goal of this requirement was to ensure that every state could sustain a long-term wildlife restoration and management program.

This was the foundation that allowed Montana to employ its first professional wildlife managers and to start dedicating land for wildlife. Since its passage, the states have received more than $1 billion in apportionments. The Federal Aid in Wildlife Restoration Act started the most aggressive and constructive wildlife restoration program ever undertaken.

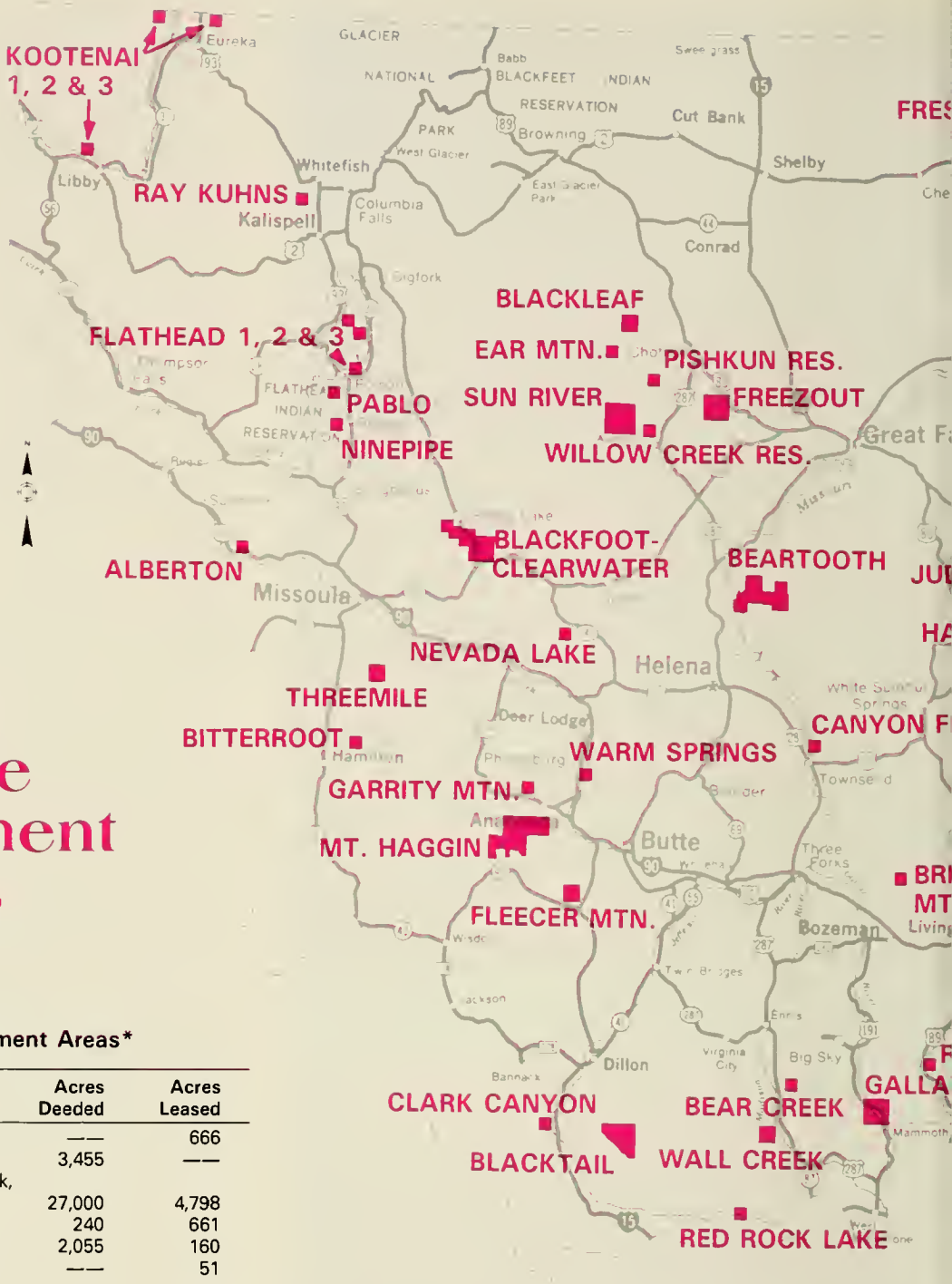
The Elk Winter Ranges

In its first year, the new law brought in almost $3 million nationwide. Montana invested a portion of its first share on 237 acres of elk habitat in the historic Judith River country southwest of Lewistown. Before the turn of the century, when cowboy artist Charlie Russell painted nearby, elk had just about disappeared. With creation of a national forest game preserve and reduction of poaching through law enforcement, the elk began to come back, and by the 1930s, 300 elk wintered on the east side of the Little Belt Mountains.

This initial purchase became the Judith River Wildlife Management Area. Today, its deeded, leased, and associated public lands exceed 5,300 acres. This relatively small, strategically located area now provides winter forage for 700 to 800 elk and half as many mule deer. Between December and May, it supports up to 80% of the elk in the Judith River drainage. Animals wintering on the Judith range over half a million acres in the summer.

Most wildlife restoration work was suspended during the war years, but problems with elk continued. Montana made its second investment in the Gallatin River Valley just outside the northwestern corner of Yellowstone Park. This was a traditional wintering area for elk that summered high in the park. In 1941, the carrying capacity of the winter range was estimated at 1,880

State Wildlife Management Areas



State Wildlife Management Areas*

WMA	County or Counties	Acres Deeded	Acres Leased
Alberton**	Mineral	——	666
Bear Creek	Madison	3,455	——
Beartooth	Lewis & Clark, Cascade	27,000	4,798
Big Lake	Stillwater	240	661
Bitterroot	Ravalli	2,055	160
Black Bluff**	Yellowstone	——	51
Blackfoot-Clearwater	Missoula, Powell	11,494	37,964
Blackleaf	Pondera	8,115	562
Blacktail	Beaverhead	11,261	6,161
Bowdoin***	Phillips	156	——
Bridger Mountain**	Gallatin	——	320
Canyon Ferry	Broadwater, Lewis & Clark	——	5,000
Clark Canyon	Beaverhead	——	1,200
Ear Mountain	Teton	3,046	——
Elk Island	Richland	656	390
Flathead Lake 1,2,3**	Lake	136	——
Fleecer Mountain	Silver Bow	6,431	877
Fox Lake	Richland	1,201	160
Freezout Lake	Teton	4,813	6,634
Fresno Reservoir	Hill	——	2,960
Gallatin-Porcupine	Gallatin	7,313	3,186
Garrity Mountain**	Deer Lodge	——	1,760

WMA	County or Counties	Acres Deeded	Acres Leased
Grant Marsh	Big Horn	140	——
Haymaker	Wheatland	1,359	——
Hinsdale	Valley	280	——
Isaac Homestead	Treasure	1,202	——
Judith River	Judith Basin	4,639	234
Kootenai 1,2,3	Lincoln	2,443	——
Milk River 1,5,7, 8,9	Phillips	378	1,863
Mt. Haggin	Silver Bow, Deer Lodge	54,137	——
Nevada Lake	Powell	739	440
Ninepipe	Lake	2,983	——
Pablo	Lake	416	——
Pishkun Reservoir**	Teton	——	1,570
Point-of-the Rocks**	Carbon	——	680
Pompey's Tower**	Yellowstone	——	93
Ray Kuhns	Flathead	1,543	79
Red Rock Lake**	Beaverhead	26	——
Rigler Ranch	Park	2,965	——
Rookery	Hill	2,276	——
Seven Sisters	Richland	557	——
Silver Gate**	Park	2	——
Sun River	Lewis & Clark	12,220	7,555
Threemile	Ravalli	6,059	——
Wall Creek	Madison	6,148	918
Warm Springs	Deer Lodge	110	4,570
Willow Cr. Reservoir**	Lewis & Clark	——	1,581

*The sites shown on the map were those in the program as of July 1, 1986. All acreage figures are rounded to the nearest whole acre. The acreage figures are from the July 1, 1985, annual summary of lands controlled by the DFWP with the addition of the Rigler Ranch in Paradise Valley, which was acquired in April of 1986.

**These sites do not have an active management program at this time.

***Managed as part of the Bowdoin National Wildlife Refuge in cooperation with the U.S. Fish and Wildlife Service.

elk, but the summering herd was estimated at 2,600. The wintering country had been hurt. There was almost no aspen reproduction visible. Willows were disappearing, and young fir, spruce, and lodgepole pine had been severely damaged. Almost 200 elk carcasses were found on the winter range in spring of 1943. In the midst of bitter controversy, the 1945 Legislature authorized purchase of 6,188 acres of alternating sections of railroad land.

Additional land was purchased in 1951, 1957, and 1963 and almost 3,200 more acres of railroad land was leased in 1973. The DFWP had to work through a controversy about natural vs. artificial winter feeding and a tough herd reduction program. But today the range shows some signs of recovery and the 10,499-acre Gallatin-Porcupine WMA now winters from 350 to 450 elk.

After the war, the number of hunters increased dramatically, and so did the restoration fund. In 1948, the federal money available for land acquisition increased almost sixfold from the preceding year. That year, Montana made two of its most notable investments: Purchase of two ranches on the East Front of the Rocky Mountains just south of the Sun River, and purchase of the Boyd Ranch at the junction of the Blackfoot and Clearwater drainages 30 miles northeast of Missoula.

During the war years, there was a decrease in hunting pressure and an improvement in moisture conditions and the elk population in the wild, high country west and north of these two ancestral wintering grounds increased sharply. The wintering country had been settled—divided up, fenced, and used for raising cattle, horses, mules, hay, and grain. There was no way to avoid increasing competition and severe damage to crops and forage. Faced with the choice of eliminating the elk or buying the ranches, the Fish and Game Commission chose the latter.

The initial purchases were added to and today the 19,775-acre Sun River WMA serves as a winter area for elk that have a summer range of about 1,000 square miles. Hunting on much of the east side of the Bob Marshall Wilderness is directly influenced by the condition of forage on this winter range. Winter distribution of elk along the East Front shifted after the dedication of the Sun River game range for elk. During the winter of 1946-47, only 36% of the Sun River elk used the area; three winters later, 79% of the elk used the area after December. Today, the Sun River WMA supports the largest single elk herd in Montana outside Yellowstone Park.

The Blackfoot-Clearwater WMA is a similar story. Some 49,458 acres, more than three-fourths of which is leased from Champion International Co., Burlington Northern Railroad, and the Department of State Lands, supports over 800 elk that summer on 200,000 acres of the Lincoln-Scapegoat country.

In the first 10 years of the Wildlife Restoration Act, between 1938 and 1948, 38 states acquired nearly 900,000 acres of refuges and wildlife management areas. Montana's first 30,000 acres of elk winter habitat cost the sportsmen of Montana less than $10 an acre.

Elk seek out the same winter ranges year after year. In Montana, these lands are in short supply. Winter ranges for elk in Montana account for less than 10% of the land used during the summer. By closely observing annual migrations, biologists have been able to map these critical wintering sites.

Before settlement, the valleys that now contain population centers wintered elk. For the most part, these areas are no longer available. Now elk use lower elevation foothill areas, with southerly or westerly exposures, where wind and sun combine to make food available. These are also popular areas for wintering livestock and rural homesites.

KEITH AUNE

Freezout Wildlife Management Area

For 40 years, it has been clear that the future of elk in most of Montana depends on ensuring that a portion of this essential winter habitat remains available. Eighteen of 47 WMAs were purchased with this in mind. They were acquired slowly, as money and land became available and as sportsmen's interest developed.

Seven elk ranges were purchased in the 1950s and '60s. All were under 8,000 acres and all were purchased to minimize game damage and to avoid growing game damage controversy as much as to serve elk. Two areas in the Bitterroot Valley help to short-stop elk heading west out of the Sapphire Mountains. Two other WMAs, Wall Creek and Bear Creek, protect portions of the Madison Valley from elk coming out of the Gravelly and Madison ranges. The Fleecer Mountain WMA protects a portion of the lower Big Hole Valley. Garrity Mountain and Haymaker WMAs serve growing elk populations west of Anaconda and in the Little Belts.

The height of the elk winter range program occurred during

GARY OLSON

Blackleaf Wildlife Management Area

DICK ELLIS

Mt. Haggin Wildlife Management Area

the first six years of the 1970s. Generous donations combined with the intercession of The Nature Conservancy (a private, non-profit land-purchasing conservation organization), good fortune, and wise negotiating got the state three ranges totaling 103,357 acres. The Beartooth WMA secured the future for elk in the Big Belt Mountains east of the Helena/Great Falls highway. The 17,422-acre Blacktail WMA serves elk on the west side of the Snowcrest Range, 30 miles southeast of Dillon. The huge Mount Haggin WMA has had rough going during the last 100 years, but it now has the potential to become one of the most impressive wildlife management areas in the intermountain west.

In all, the 18 elk wintering areas total 234,995 acres (170,140 deeded, 64,855 leased). They support an estimated 12% to 16% of the approximately 80,000 elk now wintering in Montana, and make up slightly under 84% of all WMA lands in the state.

Wetlands for Waterfowl

In the late 1940s, the DFWP surveyed all major wetlands in Montana. Starting in 1949, the department, in cooperation with the Bureau of Reclamation and Bureau of Land Management, acquired control of several wetland sites along the Milk River in Phillips County. In 1952, the department purchased Fox Lake west of Sidney, then Freezout Lake near the East Front of the Rocky Mountains, Ninepipe (1953) and Pablo (1955) WMAs south of Polson, and three islands for geese in Flathead Lake.

The department now manages 16 wetland sites, totaling 20,951 acres. Most of these areas are associated with impounded waters and many were considered waste areas before the department became involved with them. More than half of the wetland acreage (13,888 acres) is leased, the majority from the Bureau of Reclamation.

Management objectives for the wetlands are threefold: (1) to preserve the wetlands and improve them for production of waterfowl, shorebirds, upland game birds, and other wildlife; (2) to provide hunting and other recreational opportunities; and (3) to minimize crop depredation on surrounding lands. Some of these WMAs, like Ninepipe, Freezout, and Warm Springs, are

continued on page 24

"The Preachings of an Old Hunter"

(reprinted by permission of author)

by Joel M. Vance
illustrated by Robert Spannring

Yes, I read "The Old Man and the Boy" and I know how geezers are supposed to take a wet-nosed kid and make something of him.

Maybe half the classic sporting literature involves some old codger with a gawky kid in tow, out there showing him the mysteries of life, where the mushrooms grow and the grouse drum.

You get the feeling that every old man is issued a kid, ignorant, but not stupid, whom he can bore silly for hours on end. Did anyone ever stop to think there probably are many old woods rats who don't want to be bothered?

My Grandpa Vance was one of them. I was the runt of the grandkid litter, but he was just as indifferent to the strong pups as he was to me. He wasn't spiteful or mean—he just was powerfully disinterested in passing along his lore to a kid who looked as if the next strong wind would blow him away anyway.

Our country in the 1940s was tough duty for farm folk. They raised some tobacco, their own food, and enough hay and grain for a few cows and pigs. It was subsistence farming on an 80 or a 160, and it was tough. No time for visiting city kids with allergies and no muscles. Once I brought fleas into the house and my aunt hided me good.

My Grandpa looked the way Wild Bill Hickok probably would have looked in 20 years had he not incautiously sat down in front of a bullet (Wild Bill, not my Grandpa) in a Deadwood, South Dakota, saloon.

Grandpa had a drooping white mustache, and was so fiercely independent that when he went bald, he glared at Mother Nature with an outraged eye and grew another head of hair. It was thin, but by golly, it was there.

I remember him as tall and lean, though to a little kid, everybody was tall. He was lean, for he was a hill man. Game was scarce in the 1940s, and you had to walk a long way and make the bullets count. He did both.

He was a carpenter by trade, and his name was Joseph, though I'm sure there were no Biblical implications. He was a Christian, but instead of fishing for souls, he fished for catfish in the muddy river using hand-made fish traps that were as exquisitely crafted as they were illegal.

Maybe Grandpops of literature twinkle and beam at their piping grandsons, and generously include them on woodland rambles, but not my Grandpa. He'd worked about 65 years to ensure his privacy and, by God, he was going to enjoy it. If there were the slightest indication that I was interested in tagging along, he would glower fiercely at me, like an old lion pestered by a bumptious cub, and I would swallow whatever timorous suggestion had been on my lips and resign myself to another afternoon of vicarious adventure with his hunting magazines.

Grandpa could be found in one of two places—either the extensive woods to the West or somewhere along the old river, tending his ever-producing traps. That was a two-mile hike each way and when I knew him, he was already well past 70, barreling toward his 80s with a steady, measured gimp.

No problem. I would see him methodically marching across the back pasture, finally vanishing over the far hillcrest.

No one ever seemed to worry much about the old man off by himself God-knows-where in the woods. No one fretted that he might hurt himself or become ill with no chance of help. I guess they either figured he was indestructible or that if he were to go, he'd want to be out there, not at home or, even worse, in a hospital connected to life by needles and tubes.

Along about sunset he'd come trooping home, carrying in one hand a Marlin bolt action rifle my Dad had given him, in the other a couple of squirrels. Maybe he sometimes came home empty handed, but I sure don't remember it.

That was the way it was more than 40 years ago. I can't say that he left me a direct legacy of hunting how-to or outdoor lore. He figured life was a game you learned by playing and he wasn't interested in being my coach.

On the other hand, why, if there were no bond between us, do I remember so clearly his fierce independence, his frosty-blue eyes, his steady, proud figure coming home from the hill?

No, the teaching was there all right. He taught by example, whether he intended to or not. And he let me prowl among his meager possessions—the Indian artifacts he'd picked up here and there, the collection of Indian-head pennies, his magazines and books. Once, I was off in some little make-believe world, probably talking to myself in the voices of three or four characters, when I happened to look up. He was peering at me over his bifocals, and there was no mistaking the smile under that bushy mustache.

Thinking back on it, he must have made me feel welcome in his sanctuary, or I wouldn't have been there. I never was uncomfortable in his house. It was home to me, as well as to Grandpa.

And then there came the day that the old oak of a man was felled by the lightning bolt of a stroke. For the first time his sanctuary was violated, by his own alien, stunned body, and by weeping relatives. I didn't want to go there anymore.

I'm older now and others I love have gone over the far ridge from which there is no return. But others have come on. My own boys watched as I left on hunting trips, and then they went along. Now they are almost men.

Maybe they'll have youngsters who will dust my floor with themselves while I rock and read. I don't feel much like a Grandpa with twinkling eyes and an ever-flowing mouth. But when my youngest, Andy, is cold and tired and far from home, and I still see him plodding wordlessly along in my wake, not complaining and not wishing he were somewhere else, I feel what I now know my grandfather felt.

Pride and love and hope.

Now when I pick up my gun and go to the big woods alone, I realize that maybe there is a constant in this world of shifting sands. I realize that when I reach the crest of the far hill, there will be a pair of young eyes watching me from the yard.

The eyes of one who dares to dream and dares to hope... ■

CONTRIBUTORS

• Forty-seven wildlife management areas comprising about 281,087 acres across Montana are "Dedicated to Wildlife." Their uses are many—hunting, camping, picnicking, research, and providing opportunities to watch and photograph wildlife. On them, wildlife is the No. 1 priority, and they also offer a graphic example of the importance of the wildlife support system: the soil, water, and vegetation. Turn to **Mike Aderhold's** article on page 2; he is the department's information officer for Region 1 (Kalispell).

• **Joel M. Vance** continues the *Montana Outdoors* "Perspectives" series with "The Preachings of an Old Hunter." It's not one of those stories where the old geezer shares his gilded bits of knowledge with the young, eager boy-hunter. Instead, the sharing is subtle, and the teaching by example. Both the geezer and the boy end up feeling pride, and love, and, most of all, hope. Joel is a writer for the Missouri Department of Conservation; his byline is often seen in major outdoors magazines and many other publications. He is the author of three books, "Grandma and the Buck Deer," "Confessions of an Outdoor Maladroit," and "Upland Bird Hunting." He is a vice president of the Outdoor Writers Association of America, and received that group's "Excellence in Craft" award in 1980. To discover why, turn to page 8.

• The "old hunter" illustration was prepared especially for Joel's article by **Robert Spannring;** he captures in color the character Joel creates with words. Robert has been a professional artist and free-lance illustrator for over 10 years. He works in watercolor, pen and ink, acrylic, pastel, serigraphy, lithography, and ceramics. He has had dozens of successful exhibitions throughout the Northwest, and his work has been published in, among others, the first edition of "The North Face of Yellowstone Park." His work has also graced our covers and inside pages on numerous occasions. For more information about his work, contact him at P.O. Box 1055; Livingston, MT 59047 (406/222-0404).

• Rough fescue is crucial to elk wintering on the Sun River Wildlife Management Area. Absence of fire or grazing allowed about 600 acres on the game range to become "wolfy"—the old-growth material accumulated and the rough fescue's attractiveness to wintering elk decreased. So researchers designed a project using cattle and prescribed fire. As **Craig Jourdonnais** and **Don Bedunah** write, "The project showed that fire and livestock grazing improve forage quality and availability for wintering elk, at least on a short-term basis." Craig is a warden in Region 1 (Kalispell). He worked for the department on the Sun River for four seasons, and this article is a shortened version of his master's thesis in range resource management from the University of Montana. Don is professor of range resource management at UM and was Craig's advisor on the Sun River project. Turn to "Burning Issues on the Sun" on page 15.

• " 'Happy Holidays' from a Few of Our Friends" comes to you from five prominent Montana artists—**Karen Ray Brower, Shirley A. Johnson, Robert Neaves, Jeff Walker,** and **Jim Wantulok.** You'll also have a chance to share some of their thoughts about art, and about the specific piece "enclosed" in this holiday greeting.

Karen Ray Brower's attention to detail and accuracy reflects her academic training: She holds bachelor's and master's degrees in biology. She has lived in Butte for four years, and previously worked and exhibited her art in Bolivia and South Africa. Her work has won awards in many Montana shows and is included in private, museum, and corporate collections worldwide. It can be seen at the following Montana galleries: Wishing Tree Galleries, Livingston and Billings; the Crow's Nest, Polson; Tatem House, Helena; and the Rectory Gallery and Copper Village, both in Anaconda. Her studio is also her home and her work can be seen by appointment at 2828 Goodwin; Butte, MT 59701 (406/494-4179).

Shirley A. Johnson has been guest artist at shows throughout the Northwest since turning professional in 1978. She has a "Best of Show" to her many credits. She was commissioned by the Montana Council, Boy Scouts of America, to do a series of paintings; the first one, "Trail to the Eagle," has been published and is now internationally distributed. Her paintings can be found in private collections and galleries throughout the United States, Canada, and Japan. Among the Montana galleries showing her work are Gallery 85, Billings, and Many Hands Gallery, Missoula. For information about her work, contact her at #6 Greenbrier Drive, Lincoln Hills; Missoula, MT 59802 (406/728-8119).

Robert Neaves' "greeting" for this issue, "Moving Down," won first place in the Big Game Category of the North American Wildlife Show in Cheyenne, Wyo. His work continues to attract widespread acclaim—his painting of three bighorn sheep was the wraparound cover for *Wyoming Wildlife's* 50th anniversary issue. He was also the "featured western artist" at the Iowa Wildlife and Western Art Show in Des Moines, and was invited to participate at the Idaho Wildlife Art Show, a juried show in Boise. His work can be seen at his studio, Western Images, 730 Hamilton Heights Road; Corvallis, MT 59828 (406/961-4808).

Jeff Walker's etchings, watercolors, and oils have been seen at the C.M. Russell Museum and Auction, at the National Wildlife Show in Kansas City, and at the Western Wildlife Show in Minneapolis. One-man shows and representation in leading galleries and auctions demonstrate acceptance of both his subjects and artistic talents. His etchings are limited to 75 prints or less, numbered and signed by the artist. He not only creates the image; he places acid on the image plate, inks each by hand, and prints them one at a time. His art can be seen at Glass-Art Shop, Great Falls; Tatem House, Helena; Glacier Gallery, Kalispell; Wishing Tree Galleries, Livingston; and Montana Troutfitters Orvis Shop, Bozeman. Jeff can be contacted at 600 Central Plaza, Suite 300; Great Falls, MT 59401 (406/452-9613).

Jim Wantulok works from Wild Life Paintings at 1907 S. Tracy; Bozeman, MT 59715 (406/586-6598). A Bozeman native, his many hours spent in the outdoors are clear in his work. His art has been shown extensively in the West, and he has had one-man shows in Montana, Washington, Oregon, and Texas, and he is represented by galleries in those states. His paintings also hang in private collections throughout the United States.

• This "Moment in Montana Prehistory" is a particularly tantalizing one. Imagine hunters of the very long ago and, as the quarry, a creature weighing tons and towering 14 feet. A creature with tusks nine feet long, weighing 150 pounds each. They were "In Search of Early Elephants" and **Les Davis** suggests these Stone Age hunters might have been successful. Les is professor of anthropology at Montana State University and serves as an associate curator of anthropology and archaeology for the Museum of the Rockies. Turn to his article on page 27.

• Special thanks to the following photographers: **Michael H. Francis,** Billings; **John L. Hautzinger,** Helena; **Neal** and **M.J. Mishler,** Great Falls; **John W. Warden,** Anchorage, Alaska, and to the following photographers who work for the department: **Mike Aderhold** and **Craig Jourdonnais,** Kalispell; **Keith Aune,** Choteau; **Dick Ellis,** Bozeman; **Mike Gurnett** and **Tom Warren,** Helena; and **Gary Olson,** Conrad.

Fall Meeting: Eagles and Salmon in Glacier

As cold fall winds sweep across northern Canada, bald eagles begin to fly south toward wintering areas in the southwestern United States. On the way, many stop along McDonald Creek in Glacier National Park to feed on coppery-red kokanee salmon. These "landlocked" sockeye salmon are on a fall migration of their own, swimming 60 miles upstream from Flathead Lake to spawn and then to die in the lower two miles of the creek.

The dying fish are easy prey for the eagles, which perch by the hundreds on trees along the creek, to feed and thus to build fat reserves for continuation of their flight south. The gathering provides spectacular opportunities for park visitors to view and photograph the eagles from Apgar Bridge near West Glacier.

This rendezvous of eagles and salmon began in the late 1930s, after the kokanee (introduced into Flathead Lake in 1916) began significant spawning runs into McDonald Creek. The gathering has blossomed into one of the largest in North America. For example, in 1985, biologists recorded single-day peak counts of 520 eagles and 123,000 kokanee. However, it's hard to estimate how much longer the gathering will continue in its present form. The number of eagles gathering along the creek could drop because of (1) threats to the salmon spawning run, and (2) attraction of some eagles away from Glacier to other salmon-spawning spots.

Clearly, the fate of eagles and salmon is closely tied. So it follows that threats to the salmon also spell trouble for the gathering eagles. Recently, kokanee in Flathead Lake have had to face a competitor for their food supply. This competitor, the opossum or mysid shrimp *(Mysis relicta)* feeds on the same tiny crustaceans that kokanee relish. If shrimp continue to increase, kokanee populations in the lake and spawning runs into McDonald Creek could decline.

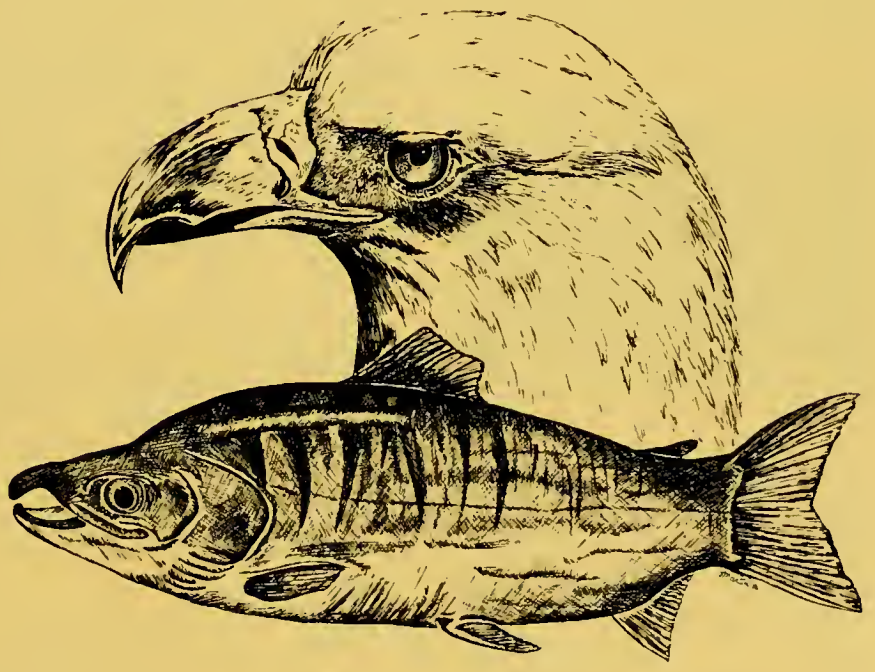
Even if numbers of kokanee in McDonald Creek remain high, fewer eagles might gather along the creek if they are attracted to other sites where kokanee populations are expanding. Observers have seen increasing numbers of eagles along the Flathead River and the South Fork of the Flathead where numbers of spawning kokanee appear to be on the rise because of better flow conditions below Hungry Horse Dam. In the last five years, large numbers of kokanee in Lake Koocanusa (the reservoir created by Libby Dam) have established spawning runs into tributaries of the Kootenai River in Canada. Bald eagles will home in on these spawning kokanee; biologists aren't sure whether this will reduce the number of eagles that gather at Glacier.

If the gathering of eagles and salmon does not continue as it has in Glacier, many visitors to the park will be disappointed. The gathering attracts tens of thousands of people each year from all over the United States, Canada, and other countries. They come to take advantage of what might be the best opportunity to see bald eagles on the continent. When the viewing is good, you can see up to 100 birds from the Apgar Bridge. One often sees birds swoop down, pluck weakened salmon from the creek, and then return to their perches to consume them. According to Glacier Park biologists, the best viewing period is late October through late November. Average date for peak eagle numbers along the creek since 1965 has been Nov. 16.

In recent years, Glacier Park officials have improved viewing at Apgar Bridge. Viewers now reach the bridge by a short foot trail and nobody is allowed to walk along the creek and disturb the birds. Each year, the eagles seem to become more accustomed to humans.

Excellent opportunities for nature education exist while the eagles gather in Glacier. Staff interpreters are on the bridge most of the time, offering close-up views of the birds through a mounted spotting scope. In the Apgar Visitor Center, the staff is friendly and knowledgeable. Interesting exhibits and brochures highlight the salmon/eagle story. Youngsters especially enjoy seeing the eagles and salmon; there is probably no better way for them to see firsthand the ecological tie between two wildlife species. Recognizing this, teachers brought 50 or 60 school groups to Glacier during the eagle/salmon gathering last year.

So the gathering has become very important. It is important ecologically—to the eagles who need a protected area to feed and to build fat reserves for migration. It is important to tens of thousands of visitors to Glacier, many of whom are perhaps seeing bald eagles for the first time. A phenomenon that began because of the introduction of an exotic fish into Flathead Lake may not continue as it is; nothing in nature is set in stone. But, with luck, eagles and salmon will continue their fall rendezvous along McDonald Creek for a long time to come.—*John Fraley, fish and wildlife biologist, Kalispell*



graphics ALICE MARTIN

Montana Outdoors Takes Second

Montana Outdoors has been selected North America's second best conservation magazine by the Association for Conservation Information, Inc. (ACI). *Wyoming Wildlife* took first place in the annual competition, and *South Carolina Wildlife* came in third. ACI is an organization of personnel from state and federal wildlife agency public affairs offices throughout the United States and Canada.

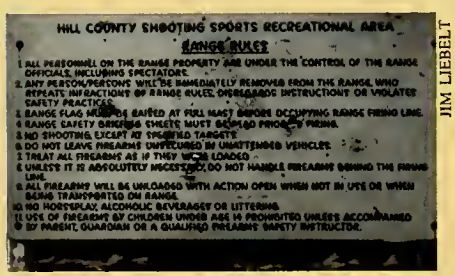
MO competed with 22 state conservation magazines in the writing and graphics evaluation.

One of the judges, Leonard Wallace Robinson of Missoula—a former reporter and writer for *The New Yorker*, managing editor for *Esquire*, and fiction editor for *Collier's*—gave *MO* a perfect score. He called it a "wonderful magazine" and "breathtaking." The other judge, Ruth Norris, former Washington editor for *Audubon*, wrote in her evaluation, "*Montana Outdoors* stands out...for its 'general' appeal to a diverse audience, showing that outdoors people have a broad range of interests."

The awards were presented at ACI's annual conference in July, conducted at Safari Club International Conservation Fund's Granite Ranch near Jackson, Wyo.

Vandals Strike Gjersing Memorial

The Rookery Wildlife Management Area, five miles west of Havre along the Milk River, was dedicated to the memory of Frank Gjersing on Oct. 23, 1985. The area was of special significance to Frank, since it was largely through his efforts that the Department of Fish, Wildlife and Parks purchased the 2,236-acre property.


HILL COUNTY SHOOTING SPORTS RECREATIONAL AREA
RANGE RULES
1. ALL PERSONNEL ON THE RANGE PROPERTY ARE UNDER THE CONTROL OF THE RANGE OFFICIALS, INCLUDING SPECTATORS.
2. ANY PERSON/PERSONS WILL BE IMMEDIATELY REMOVED FROM THE RANGE WHO REPEATS INFRACTIONS OF RANGE RULES, DISREGARDS INSTRUCTIONS OR VIOLATES SAFETY PRACTICES.
3. RANGE FLAG MUST BE RAISED AT FULL MAST BEFORE OCCUPYING RANGE FIRING LINE.
4. RANGE SAFETY GLASSES/EAR SHIELDS MUST BE WORN PRIOR TO FIRING.
5. NO SHOOTING EXCEPT AT SPECIFIED TARGETS.
6. DO NOT LEAVE FIREARMS UNATTENDED IN UNATTENDED VEHICLES.
7. TREAT ALL FIREARMS AS IF THEY WERE LOADED.
8. UNLESS IT IS ABSOLUTELY NECESSARY, DO NOT HANDLE FIREARMS BEHIND THE FIRING LINE.
9. ALL FIREARMS WILL BE UNLOADED WITH ACTION OPEN WHEN NOT IN USE OR WHEN BEING TRANSPORTED ON RANGE.
10. NO HORSEPLAY, ALCOHOLIC BEVERAGES OR LITTERING.
11. USE OF FIREARMS BY CHILDREN UNDER AGE 14 PROHIBITED UNLESS ACCOMPANIED BY PARENT, GUARDIAN OR A QUALIFIED FIREARMS SAFETY INSTRUCTOR.
JIM LIEBELT

Frank began working for the department as a wildlife biologist in 1971 and was stationed in Havre. While making an aerial survey along the Missouri River on June 11, 1983, Frank was killed when the plane struck an unmarked power line and crashed. Frank's death deeply affected his colleagues within the department, as well as his many other friends.

Ken Walcheck, one of Frank's closest friends, probably best summed up his attributes in the Nov./Dec. 1983 issue of *Montana Outdoors:* "...there was no doubt of his commitment to wildlife. More than anyone I ever met, he was the kind of person sportsmen like to see in a state wildlife agency. Above all, he cared about people....If somebody needed help, he was always there.... Frank was respected by his peers for both his expertise in wildlife management and for his firm stands for what he believed in."

Frank and his wife Mary lived on the Rookery property for several years before eventually moving to Havre. A part of this property includes one of the finest outdoor shooting ranges in the state, and a memorial plaque dedicated to Frank's memory was placed there.

Some time last spring, vandals hit the memorial and shooting range. They shot the plaque full of holes, demolished toilets, and did considerable damage to other parts of the facility. The person or persons responsible remain unknown.

The memorial plaque has been replaced, and some of the other damage to the shooting range has also been repaired. Yes, the damage can be fixed. However, the vandalism of Frank's memorial is beyond comprehension and makes one wonder how people can be so thoughtless and uncaring. We can only hope it won't happen again and that the person or persons responsible will soon be caught and made to pay for this criminal act.—*Jim Liebelt, Region 6 (Glasgow) information officer*

Lone Pine Expo

The largest wildlife and nature photography show in Montana will run Dec. 13-14 at Lone Pine State Park and Visitor Center near Kalispell. The expo will feature the work of professional and amateur photographers such as Steve Wirt, Tom Ulrich, Joyce Clark Turvey, Joe Potoczny, William Munoz, Louis M. Kis, Tom Holland, Diane Ensign, and Rick Bartel.

The exhibit will run from 10 a.m. until 5 p.m. both days. Framed or matted prints, date books, posters, calendars, post cards, and books will be on display, and many of the items will be for sale. Lone Pine Programmer Becky Smith notes the show will provide an opportunity to purchase some interesting Christmas gifts.

The park is five miles southwest of Kalispell; from U.S. Highway 2 in Kalispell, turn south on Meridian Road to Foy Lake Road. After four miles, turn left at the Lone Pine State Park sign.

For additional information, contact Smith at 406/755-2706.

Before the Snow Flies, Check Your Snowmobile

Snow on the ground is good news for hunters and skiers. But it's also exciting for snowmobilers with a strange ache or twitchy feeling in the thumb of their throttle hand.

Before you rev up your machine for the first ride of the year, it should be thoroughly checked—for safety's sake. If you own a snowmobile, read the owner's manual. Then read it again. If you've lost or misplaced yours, a qualified snowmobile service center can provide assistance. Remember, it's extremely important that your machine is correctly serviced before you travel anywhere on it.

Following is a simple list of things to check, adjust, or replace:

- replace spark plugs: replace fuel filter and tune the carburetor;
- check the drive belt for cracks and stretching;
- check the track for lost or loose cleats;
- check drive holes for ply separation;
- check alignment and tension of track;
- check ski alignment and wear rods;
- lubricate and adjust chain tension;
- check shocks and light bulbs;
- lubricate clutch and inspect and adjust brakes;
- inspect bogie wheels and slides;
- tighten any loose nuts or bolts;
- assemble an emergency spare parts and tool kit and carry it with you on the snowmobile.

Along with checking the machine out before your first ride, review snowmobile laws and other safety information. Your snowmobile must be registered every year, and the Department of Fish, Wildlife and Parks has free information about safety and legal requirements.

Snowmobile clubs also offer safety information and assistance in learning to drive a snowmobile. Locals clubs are good sources for information about organized rides, location of trails, and other activities.

Snowmobile accidents occur every year, and the number appears to be increasing. Probably the major reasons are more snowmobilers and carelessness. Most accidents in which there are injuries involve the snowmobile and rider hitting something, such as a tree, pole, rock, fence, etc. Most fatal accidents involve the snowmobile and rider striking or being struck by an automobile on a highway or road.

Snowmobilers are not permitted to ride on public streets or highways. The only exceptions are in Lincoln and West Yellowstone, where crossing public highways is permitted if the rider stops before reaching the road and yields the right-of-way to oncoming traffic. If more than two snowmobiles are involved, one rider should get off and, when safe, walk onto the road and direct the crossing of the other snowmobiles. Riding on public highways is still prohibited in these two towns.

Some other tips to remember:

- Always ask permission to ride on private land.
- Avoid areas used by wildlife; additional stress and strain on animals already facing winter is detrimental to their condition.
- Always be aware of other riders.
- Be aware of local weather forecasts and ice

and snow conditions.

- Watch your speed.

A safe snowmobiling season is more than just a matter of luck. Preparation now will head off trouble in the snow.—*Tim Pool, supervisor, Recreation Safety Education Program*

BOOK REVIEWS

MIST ON THE RIVER: REMEMBRANCES OF DAN BAILEY, by Charles F. Waterman, Yellowstone Press, P.O. Box 1019, Livingston, MT 59047; 1986, 193 pages; $19.95, hard cover.

Not many fishermen achieve such notoriety that an entire state, indeed, followers of the sport around the world, mourn their passing. Yet, when Dan Bailey died in 1982, the Montana Fish and Game Commission and Gov. Ted Schwinden proclaimed Aug. 14 as "Dan Bailey Day," urging all Montanans to go fishing and "observe the contributions of Dan Bailey that are now recorded and remembered through sparkling riffles, still pools, and wild trout."

As Charles Waterman points out, Dan Bailey was more than a fisherman—he was a conservationist, businessman, fly-tying innovator, and advisor to thousands of anglers who came to sample Montana's heralded trout streams. Yet, the message comes through that Bailey was, above all else, a man who loved to fish.

By moving to Livingston, Mont., to open a fly-fishing shop in the 1930s, Bailey gave up a career in atomic physics; it was a big gamble, since most of the world had not yet discovered Montana's aquatic treasures. But the gamble paid off, because Dan Bailey's fly shop eventually became a Montana institution and an attraction for anglers the world over. Such is its reputation today that many Montanans who have never owned a fly rod have heard of Dan Bailey's shop.

Waterman is a natural storyteller, and his humorous accounts of fishing and hunting with Bailey make fascinating reading. Dan emerges as a likable, sometimes nonchalant fishing companion who, despite his expertness at fishing and wading Montana's larger rivers, especially enjoyed prospecting for smaller trout on Montana's lesser known streams. For Dan Bailey, it was the act of fishing, not the size or number of the fish, that held the attraction.

The book is illustrated with numerous black-and-white photographs that were taken over the years, many of them featuring such fly fishing stalwarts as Joe Brooks, Bill Browning, Red Monical, and Dan's son, John. The latter half of the book is devoted to the waters that Dan Bailey loved and worked throughout his life to protect—the Yellowstone, Madison, Big Hole, Beaverhead, Gallatin, and Jefferson, to name a few. While it's far from a "how-to" book, "Mist on the River" is a valuable guide to fishing Montana's fabled trout waters as well as a poignant remembrance of a remarkable man.—*Dave Books*

TRANQUILLITY, by Col. H.P. Sheldon, Willow Creek Press, P.O. Box 2266, Oshkosh, WI 54903; 1986; $45, slipcased three-book set, hard cover.

"Tranquillity," first published in 1936, has been re-released along with its companion volumes "Tranquillity Revisited" and "Tranquillity Regained." Each book is a collection of stories revolving around the outdoor life in an imaginary township in Vermont called "Tranquillity." The same cast of characters—the Captain, the Dark Haired Lady, the Judge, and an assortment of salty new Englanders—appears in most of the stories.

Sheldon had an excellent ear for dialect, and the colorful speech and mannerisms of the local inhabitants lend these books a special charm. The stories deal mostly with ruffed grouse, woodcock, black ducks, and brook trout—although squirrels, woodchucks, bullheads, and even a "bee tree" make cameo appearances. They're guaranteed to make you long for that unhurried and less complicated time, prior to the advent of freeways and jumbo jets, when trout fishing meant a visit to the brook that ran through town. Perhaps the outdoor scene was never as idyllic as Col. Sheldon describes it in "Tranquillity," but these classic tales are soothing and enjoyable, and well worth the reading.—*Dave Books*

MAMMALS OF THE NORTHERN ROCKIES, by Tom J. Ulrich, Mountain Press Publishing Co., P.O. Box 2399, Missoula, MT 59806; 1986, 157 pages; $8.95, soft cover.

This guidebook to 58 mammals of the northern Rockies contains 200 excellent color photographs, most of them taken by the author. Comprised primarily of species descriptions, the book also contains short sections at the beginning on color variations, rutting behavior, horns and antlers, fur, and tracks. For most species, the accompanying photos show adults (both sexes in some cases), young, and characteristic behavioral traits. This book will fit conveniently in a glove compartment and is a useful and attractive guide to the mammals of our region.

HUNT ELK, by Jim Zumbo, Winchester Press, New Century Publishers, Inc., 220 Old New Brunswick Road, Piscataway, NJ 08854; 1985, 252 pages, $17.95, hardcover.

Wait a minute—what's this? Some guy from somewhere intends to expand the knowledge of elk hunters with a BOOK? Everyone knows that after spending a little time in the West, you automatically know how to rope calves, know the difference between a crowbar and a tool bar, and most certainly know how to hunt elk. However, should you feel that you would rather not put all your faith in knowledge gained through osmosis, Jim Zumbo has collected the discoveries he has made through 20 years of hunting the toughest, most unpredictable big game animal in this country.

"Hunt Elk" takes the reader along on several successful trips, giving tips in order to sidestep mistakes which could be made along the way. Whether you are reading the chapter which gives due respect to the spike bull or learning about "nests" while in pursuit of a mature bull, you will gain insight into how to improve your chances of finding the animal.

Written in a campfire style, the book is filled with practical information—from selection of equipment to packing an animal out. In between, Zumbo shares his ideas on hunting the same area as several other hunters, hunting the backcountry, and hunting with an outfitter.

"Hunt Elk" is a valuable addition to any elk hunter's equipment. Take it home and sign the inside front cover as if it were a gift to you from Zumbo. In a way it is. Besides, it's bound to impress even the most seasoned hunting partners.—*Mike Garnett*

MONTANA OUTDOORS INDEX

The major items published in *Montana Outdoors* in 1986 are indexed below. Extra copies of all '86 issues are available at $1.50 each plus 25 cents for postage. Some earlier back issues are available at the same price.

To inquire about or order a back issue, write: Back Issues, *Montana Outdoors*, Department of Fish, Wildlife and Parks; Helena, MT 59620.

BOOKS REVIEWED

Montana Wilderness—Discovering the Heritage—by Steve Woodruff and Don Schwennesen (March/April).

The New Compleat Angler—by Stephen Downes (March/April).

Montana's Explorers—The Pioneer Naturalists—by Larry S. Thompson (March/April).

The Grizzly in the Southwest—by David E. Brown (May/June).

Mist on the River: Remembrances of

Dan Bailey—by Charles F. Waterman (Nov./Dec.).

Tranquillity—by Col. H.P. Sheldon (Nov./Dec.).

Mammals of the Northern Rockies by Tom J. Ulrich (Nov./Dec.).

Hunt Elk—by Jim Zumbo (Nov./Dec.).

DEPARTMENT LANDS/PARKS

Whittecar State Recreation Area: Popular Spot—Over 3,500 sportsmen visit its pistol, rifle, and archery areas every year (Ruth Greenup, March/April).

Good Times in the Badlands—Makoshika State Park is a maze of broken hills, gullies, coulees, and hidden chasms (Beth R. Riggs, May/June).

Dozers for Ducks—Hard work turns scrubland into one of the gems of the state's wildlife management area system (John Alley and Ron Hanson, May/June).

7 and 8 Add Up to Diversity—Two small wildlife areas in north central Montana have much to offer hunters (Harvey Nyberg, May/June).

A Park Made Visible—A power shovel helped reveal what is now Spring Meadow Lake State Recreation Area (Paul Pacini, July/August).

Dedicated to Wildlife—The first consideration at Montana's 47 wildlife management areas is the long-term well-being of wildlife (Mike Aderhold, Nov./Dec.).

Burning Issues on the Sun—Burning and cattle grazing on parts of the Sun River Wildlife Management Area have meant better forage for wintering elk (Craig Jourdonnais and Don Bedunah, Nov./Dec.).

FISH/FISHING/WATER

"It Don't Get No Respect"—The mountain whitefish is not only a scrappy fighter, but it tastes good when properly prepared (John Fraley, March/April).

Fishes of Special Concern—Explanation and update. The Catchall (George Holton, March/April).

1985 Fishing Records Summary (May/June).

Missourians on the Madison—The Madison both wows and shows 'em (Spencer E. Turner, May/June).

The King Returns—The westslope cutthroat trout is regaining some of its former range (Rick Hull, May/June).

Flathead Lake's Midlife Crisis—Flathead Lake is on the brink of a change—for the worse (Loren L. Bahls, July/August).

Out of the Darkness—Glimpsing a white sturgeon from the depths of the Kootenai River is a never-to-be-forgotten experience (Patrick Graham, July/August).

Perspectives—"Fatso and Fussy"—The joy of catch and release fishing (Pat Barnes, July/August).

Perspectives—"Last in the Charts, But Not Least in Our Hearts"—The least glamorous fish in Montana is the sculpin (Wade Fredenberg, Sept./Oct.).

GAME/HUNTING

Discover Reloading—"Rolling" your own cartridges for fun and profit (Dennis Flath, Sept./Oct.).

Re-Creating with the "Right Stuff"—Once it's down, how should you properly care for an animal you intend to have mounted? (Gerry Schroeder, Sept./Oct.).

The Non-Toxic Steel Solution—The state's waterfowl will ultimately benefit (Don Childress and William Phippen, Sept./Oct.).

"Love Nature...And Be a Gentleman"—Dutch Braunlich has more than 70 years of hunting and fishing licenses. The Catchall (Michael Korn, Sept./Oct.).

Green Is for GO—The "Green Dot Program" emphasizes opportunity and OPEN roads (Jim Cross, Sept./Oct.).

Perspectives—"The Preachings of an Old Hunter"—Lots of old woods rats don't want to share their back roads with gawky kids (Joel M. Vance, Nov./Dec.).

Big Bucks and Big Bulls: A Status Report—Some deer and elk hunters are concerned that the big ones aren't out there any more (compiled by the Wildlife Division, Nov./Dec.).

GENERAL

Special Photo Issue—(Jan./Feb.).

Thornbrugh's "Canadas" Wins Stamp Contest—A Victor artist wins Montana's first waterfowl stamp contest (Don Childress, March/April).

Eight-Legged Predator—The spider is a predator whose life is dedicated to consuming pesky insects (Lisa Mathis Butler and G. Wesley Burnett, March/April).

A Thousand Winters Ago—A prehistoric "garbage dump" along the Missouri yields some new information about the importance of pronghorns to early Plains dwellers (Les Davis, March/April).

Perspectives—"A Name for the Game"—What we now call "skeet" was developed in Massachusetts, but it was named in Montana (Jean Walker, March/April).

Perspectives—"Up and Over the Hill"—An entire boulder turns into bear (John Allen, May/June).

Goats: Spurge Scourge—Much can be said for animals eating plants that we humans call weeds. The Catchall (Bill Pryor, July/August).

The Joy of Backpacking—Getting away from it all can be a lot of fun (John Fraley, July/August).

Farm Bill Facts—This important legislation is aimed at reducing soil erosion (Bob Martinka, July/August).

Hard C-O-R-E—This outdoor education and recreation course provides unique personal and professional challenges (Joel Meier, July/August).

"Happy Holidays" from a Few of Our Friends—Art, and thoughts (Karen Ray Brower, Shirley A. Johnson, Robert Neaves, Jeff Walker, and Jim Wantulok, Nov./Dec.).

In Search of Early Elephants—Montana hunters of the very long ago may have killed a mammoth 14 feet tall and weighing tons (Les Davis, Nov./Dec.).

NONGAME WILDLIFE

Nongame News—

March/April—history, nongame inventories, Flathead osprey, bird distribution updates, western bluebird, woodland caribou.

May/June—breeding birds, federal funding, shrew, western grebe.

July/August—tailed frog, value of a "dickey bird," flying squirrels, bat houses.

Sept./Oct.—migratory birds, field trip updates latilong 13, cavity-nesting birds.

Nov./Dec.—red-naped sapsucker, three-toed woodpecker, black-backed woodpecker, Nongame Program update.

The Mouse That Roars—The northern grasshopper mouse is one of nature's little marvels (Craig J. Knowles, May/June).

Up, Up, and Away—Montana hosts an expanding breeding population of bald eagles (Dennis Flath and Rob Hazlewood, May/June).

Fall Meeting: Eagles and Salmon in Glacier—Eagles stop along McDonald Creek to feed on spawning kokanee. The Catchall (John Fraley, Nov./Dec.).

WILDLIFE

Looking Ahead—For wildlife managers, tomorrow's biggest challenge may be coping with increasing recreational demands (Mike Aderhold, March/April).

A Reflection of Choices—Economics and other disciplines help define the often diverse and dynamic views of quality fishing and hunting (Patrick Graham, March/April).

Managing the Grizzly Bear—Some new ideas for balancing grizzly bear conservation with human needs in northwestern Montana (Robert D. Brannon, Richard David Mace, and Arnold Dood, May/June).

Bighorn Permit Goes for $79,000—An Oregon film producer paid a record amount for Montana's first bighorn sheep auction permit. The Catchall (May/June).

Operation Trophy Kill—A three-year undercover operation results in some stiff sentences (Randy Smith, July/August).

In Search of a Better Balance—Experts in energy production and natural resource management address some long-standing fish and wildlife problems associated with hydroelectric development (Mike Aderhold, Sept./Oct.).

Bleep...Bleep...Bleep—Radio telemetry helps biologists gather information impossible to get otherwise (Phil Schladweiler, Sept./Oct.).

Growler—Two biologists take Growler's measure—but the black bear also takes theirs (Charles D. Eustace, Sept./Oct.).

TOM WARREN

Burning Issues on the Sun

by Craig Jourdonnais and Don Bedunah

Imagine for a moment you are touring the Sun River Wildlife Management Area (WMA)—20,000 acres of prime winter range for elk west of Augusta, Mont. You notice the spectacular scenery, the foothills dusted with limber pine, the towering limestone reefs, the creek bottoms choked with shrubs and forbs, and the scenic rough fescue grasslands brightened by aspen thickets and an array of wildflowers. The area manager's success in maintaining the largest elk herd in Montana outside of Yellowstone National Park depends on how well he balances elk numbers with yearly fluctuations in forage production.

The manager would explain to your tour group that elk numbers are regulated through fall hunting seasons. The harvest objective is to hold elk numbers slightly below the winter range's carrying capacity. He would also explain that he must manage for the dry years, when forage production is poor.

Since 1925, area ranchers have helped to support elk during winter and spring. Snow conditions strongly influence elk use of private lands along these foothills. Most ranchers realize the historical importance of this area to wintering big game and problems arise only when elk graze longer or in greater numbers than the rancher has counted on.

The manager would continue the tour by explaining that elk and cattle graze many of the same plants and both particularly relish rough fescue, a perennial bunchgrass. Rough fescue sometimes grows more than three feet tall and in bunches two feet in diameter. It produces abundant, highly palatable leaves and is considered prime forage for elk because it retains its nutritional quality during winter.

The manager would tell you that grasses are a major part of the winter diet for Sun River elk. However, most ruminants—elk included—avoid grazing grass plants that retain old growth material, called "litter." Light or no grazing pressure or an absence of fire in rough fescue grasslands allows this old growth material to accumulate, decreasing the rough fescue's attractiveness to wintering elk.

About 80% of a grass plant can be grazed during the plant's dormancy without doing major damage. Rough fescue enters dormancy in October and usually begins new growth in April. Leaves produced during the previous growing season die. Elk graze these dead leaves without significantly harming the plants. However, some plant material must remain to intercept snow, hold moisture, and furnish enough litter to maintain or rebuild the organic matter in the soil. Lack of grazing pressure or fire causes rough

CRAIG JOURDONNAIS

Researchers experimented with controlled burning on an underutilized portion of the wildlife management area in an attempt to improve forage quality and hence attractiveness to wintering elk. Removing excess plant litter through burning or grazing can improve elk distribution and encourage elk to remain on the management area rather than moving to private land to graze.

CRAIG JOURDONNAIS

Rough fescue, a perennial bunchgrass that sometimes grows more than three feet tall, is a prime forage plant for wintering elk.

fescue communities to become "wolfy."

As your tour continues, the manager would explain that area ranchers supported hundreds of wintering elk before the Department of Fish, Wildlife and Parks (DFWP) acquired the management area in 1948. Its establishment was a major step toward reducing depredation on private land.

After acquiring it, the DFWP suppressed fire and eliminated livestock grazing. Such management decisions were common throughout the western United States at that time. Game managers believed wildfire and livestock competed with wintering elk by removing potential elk forage. They also realized the need to provide security and to improve range conditions to attract elk away from private land.

The absence of fire or grazing allowed about 600 acres on the game range to become wolfy. This condition isn't representative of the total management area, but it translates into a significant unused resource for elk. For example, to some degree, elk feed on almost 90% of healthy rough fescue plants on the management area; however, they use only 10% to 15% of plants in wolfy spots on the WMA.

As the tour continues, the manager would explain that using range improvement techniques designed to remove excess plant litter could improve elk distribution, provide relief in traditional heavy-use areas, and encourage elk to remain on the management area rather than moving to private land to graze.

The manager is responsible for the elk on 20,000 acres; it is sound management to optimize forage production and keep it in the most desirable condition.

Because of the problems arising from wolfy rough fescue sites, the DFWP and the University of Montana cooperatively designed a research project, using cattle and prescribed fire. The project's goal was to increase forage quality and availability of new plant growth by removing the heavy accumulation of old growth. The project would benefit wintering elk, adjacent landowners, and also sportsmen.

In fall 1983 and spring 1984, the DFWP used two kinds of burns with different rates of spread, temperatures, burn durations, and flame lengths. The manager would explain to the tour participants that the way a fire behaves also influences the response of vegetation after the burn.

Cattle grazing included 104 cow/calf pairs within a 250-acre pasture for two fall months in 1983. An electric fence kept cattle from the burn plots and control (no treatments applied) plots.

After the first post-treatment growing season (1984), researchers found that both fire and cattle grazing reduced forage production when those plots were compared with the control sections. However, elk used the burned and cattle-grazed plots more than the control plots during winter 1984-85. They used 24% of available forage from rough fescue plants on control areas, compared with 65% on the cattle pastures and 86% on burned areas.

During the second post-treatment growing season (1985) forage production on the areas grazed by cattle or burned recovered to the level of the control plots. Elk use during winter of 1985-86 appeared similar to the previous year. However, forage production during 1985 was influenced by record low precipitation during spring, and record high moisture in the fall. Rough fescue generally quits growing by mid-June. So it relies heavily on early-season moisture. The unusual moisture pattern in 1985 caused below normal growth in spring and tremendous growth during late summer and early fall.

The project showed that fire and livestock grazing improve forage quality and availability for wintering elk, at least on a short-term basis. Elk use on the treated areas increased by over 300% when compared with the control plots. When litter accumulation reaches an undesirable level, cattle grazing and burning could once again be used. However, the way elk are currently using the treated areas may mean that large amounts of old growth material will not accumulate.

At this point in the tour, the manager would point out that using cattle from adjoining ranches for projects of this sort increases ranchers' tolerance of wintering big game and mitigates some of the inconvenience associated with bordering a state-owned elk winter range.

As the tour winds down, the manager would note that several other department-run wildlife management areas in Montana are candidates for cattle grazing or burning to improve forage quality. (Livestock grazing is already used on the Mount Haggin and Wall Creek Wildlife Management areas, under a rest/rotation system.)

Understanding when such treatment helps or hinders big game populations is important. Each management area must be individually evaluated, and flexibility in how the treatments are applied is crucial. For example, elk might respond favorably to an *initial* cattle grazing program, but *long-term* cattle grazing could reduce forage for wintering elk.

The manager would end the tour by emphasizing that although fire and livestock grazing were once considered curses on elk winter ranges, they now play an important part in efficient management of Montana's wildlife management areas.■

"Happy Holidays" From a Few of Our Friends

Jim Wantulok
"First Signs of Spring"

I am now painting in watercolor and acrylic mix, creating subtle and moody pieces. In May of 1986, I cast my first bronze, "Outfoxed." In November, I plan on casting another of Canada geese. Living close to nature is a moral obligation of everyone. I consider myself a conservationist, as well as a hunter. What we have to understand is that nature is special and we all have to work together to save it from extinction.

Robert Neaves
"Moving Down"

"A sense of being there" means more to me than just a catchy phrase. I have tried to get my paintings to the point where man is a spectator in nature's arena, uninvolved, to create situations which are beyond most people's outdoor experiences.

By studying, observing, and living in close proximity to wildlife, I can achieve the authentic quality I desire to convey in all my work. My studio is within walking distance of a winter game range. There are waterfowl, raptors, and songbirds using the trees, grass cover, and stream on our property. I grew up next to the Bitterroot River, playing among the trees that are home to white-tailed deer and lots of other smaller creatures.

By using real habitats as a stage, and then directing my animal players in a scenario, I can create an original painting that gives the viewer a "sense of being there."

Karen Ray Brower
"Winter Solitude"

I painted this picture after a Mother's Day stroll in Yellowstone National Park minutes before a blizzard struck. Although the painting is a composite of several experiences, it captures the serenity and silence of the moment, only a few feet from Old Faithful's busy boardwalk.

I draw frequently on nature for my artistic subject matter because it is what I know and love best and is a constant source of inspiration. My work typically reveals a very intimately described habitat, a portrait of one tiny niche of the world. This microscopic view, magnified by the selective exaggeration of detail, allows the viewer to feel very closely involved with the scene, to sense the tactile and emotional nuances—to become personally involved.

Shirley A. Johnson
"Courtship Ritual"

My painting depicts the sage grouse in courtship display; the male's tail is fanned and tilted forward, while his white neck and breast are inflated. The males gather each spring on a traditional display ground, or lek, for the courtship ritual. The most dominant males are polygamous.

Pastel enables me to experiment with an unusual technique and style. My love of wildlife large and small has converted me into a dedicated conservationist. My home and studio are not far from the Rattlesnake Wilderness Area and many of my subjects are painted from my studio window, or while I hike with sketch pad and camera.

Johnson

Jeff Walker
"National Park Series—Glacier '86"

My painting and etching inspirations come from a most beautiful state, a state blessed with diversity in its landscape, wildlife, seasons, and weather. My interpretation of nature is a literal one, in that I don't believe nature can be improved upon and I only try to paint what I see.

Equipped with brush, palette, canvas, and a license to edit and arrange, I try to capture the drama before me.

READERS RESPOND

Truthful License

After taking a look at "Out of the Darkness" in the July/August *Montana Outdoors*, I showed the photo on page 27 to a friend who lives up the Bitterroot. Known for his ability to take great care and license with the truth, and glancing at the 1,500-pound sturgeon photo, he related the following story:

"Yeah, we used to have lots o' them big guys in the rivers 'round here. In fact, I caught one, almost as big as that 'un there. How? Well, in 1940, we were on the Clark Fork River road and as we drove toward Alberton, we noticed a big dorsal fin comin' out of the water. My buddy hollers out, 'My God—look at THAT!' and we stops for a minute.

"Then he says, 'I got an idea.' We drive hell-bent for leather down the road until we get to this little ranch. Charlie gets out and runs to the ranch house door and quick talks to the woman inside. He comes running out with a big ol' Leghorn rooster, tied at the hocks. He throws it into the back of the pickup and we hightail it down to the river.

"When we gets to the bank, we see that ol' sturgeon a comin'. Charlie hops out and strips about 30 or 40 yards off'n the PTO winch on the front of the pickup. Then, he takes a big ol' hay hook and hitches it on to the winch line. He takes a piece of dragline cable and whips it to the winch line about 10 feet from the end with the hook and then bolts the engine block from a 1930 Packard onto the cable fer a weight.

"Then, Charlie runs the hay hook into the rooster, and unties his feet. We lift the whole shootin' match—cable, engine block, and chicken—and heave it into the river. Charlie sets the winch on 'strip' and the cable starts reelin' off'n that winch like nobody's business.

"About 300 feet downriver, he sets the winch and then starts to draggin' it in. Well, about 40 feet into the retrieve, we hear this 'CREEEEEEEAK' sound from the winch and Charlie hollers, 'We got 'im!' as the sturgeon jumps into the air and breaches like a whale.

"Well we fought him for about an hour until the bearings started to go on the winch and the engine in the truck overheated. We finally had to stop fighting him, but the line was stretched taut. Charlie got a pulaski to cut the cable, but he couldn't cut through it and that damn fish drug Charlie's truck plumb into the river. Took us two hours to hitchhike into Alberton for a ride back to Missoula. And if you look at the big bend in the river near Ninemile, you'll still see Charlie's 1936 Ford pickup truck lodged into the bank where that sturgeon busted the cable and PTO winch off'n the truck."—*Michael Korn, Montana Folklife Project, Montana Arts Council; Helena, Mont.*

About Relative Terms

Sorry, but just one more concerning the two-ton nest ("Readers Respond," July/August 1986). More and more, people tend to record the complete answers provided by calculators, so it has become increasingly necessary to teach the concept of significant figures relative to handling calculations from measured or experimental data.

"...this super nest should weigh *about* 4,440.1317 pounds!" About? To the nearest one-tenthousandth of a pound? Good grief.

From the data—6½ feet in diameter...12 feet deep...volume is 75%—the answer should contain at most two significant figures. Thus a more appropriate answer would be "about 4,400 pounds."—*Forrest D. Thomas II, professor, Department of Chemistry, University of Montana; Missoula, Mont.*

* * * * *

We welcomed the comments of Ron Burnett of Springfield, Neb., in the letters section in the Sept./Oct. issue. If we had anticipated such an outpouring of reader response to the two-ton nest, we would have dwelt longer on this phenomenon in the original article ("Up, Up, and Away," May/June 1986). But hindsight is better than foresight, and we will continue to respond as long as faithful readers like Mr. Burnett continue to submit skeptical queries. [Oh no they won't! This is it for the two-ton nest.—The Editors]

Since Mr. Burnett is an environmental engineer, he must surely realize that form follows function. A bald eagle nest is meant to accommodate eggs and young, not, as has been implied, to store 298.5 cubic feet of air. A structure such as he perceives would be impractical because ingress and egress of the eagles and their young would be severely restricted, if not impossible.

Bird nests, while having some characteristics in common, display a wide structural diversity. Various species may use: (1) ground or cavity nests; (2) platform nests; or (3) cupped nests. Mr. Burnett's calculations are correct for the nest he described ("statant cup nest") but this is not the type of nest used by bald eagles.

Bald eagles use a platform type nest, which is built up with new materials each year. Each year's new materials cover the previous nest, resulting in an immense structure after many years of use. The nest "bowl" itself is a rather modest depression, sufficient only to keep the eggs from rolling out. As a further precaution against egg loss, eagles tend to lay oval (egg-shaped) eggs. If an egg does roll, the large end will roll faster than the small end. This results in a roll pattern of smaller and smaller concentric circles until the egg reaches the center of the nest.

Another trait to consider is the defecation technique used by nesting raptors. Many biologists and amateur naturalists are familiar with the pattern: subject bird raises rump, and extrudes (as it were) a long, arching streak of "white stuff" over the edge. This must be done from an open platform, as this "stuff" does not lend itself to successful bank shots. This is an interesting adaptation which helps keep the nest clean.

Thus, you can see, the hollow space in Mr. Burnett's diagram is really filled with nesting material. Our original dimensions were external dimensions of a structure with uniform density throughout (and the eagles on top).—*Dennis L. Flath, Rob Hazlewood, co-authors*

ALL BOOKED UP??

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Disastrous Erosion

As a seasonal resident the past 10 years and a recreational user since the late '40s of Holter Lake, I read with considerable interest "Flathead Lake's Midlife Crisis" in your July/August issue. The erosion that is taking place along the banks of Holter Lake from the dam to Meriwether Campground is disastrous. If comparison photos were available from about 1950 to today, it would prove my point.

This erosion will continue if something isn't done to correct the problem. I would like to see the Montana Department of Fish, Wildlife and Parks study the erosion at Holter and report its findings and recommendations in *Montana Outdoors.—Donald D. Surface; Great Falls, Mont.*

• *You are right—there is a problem with erosion in that area. Unfortunately, the only department-owned sections are the Beartooth Wildlife Management Area and the Beartooth Recreation Area.*—Ed.

Dedicated to Wildlife

continued from page 7

among the most intensively managed sites under DFWP control. They have dozens of water control structures and artificial nesting sites; miles of fences, dikes, and shelterbelts; and dozens of introduced food and cover plants. In addition to attracting hunters, many of these areas have become popular sites for birding and wildlife photography.

Catch-all Collection

The remaining 3% of the WMA lands are a catch-all collection of 12 sites totaling just under 9,300 acres. They were acquired for a variety of reasons, but mostly to help deer and upland game populations, to protect streamside environments, and to provide local recreation access.

Between 1968 and 1975, the DFWP acquired five sites along the free-flowing Yellowstone River between Billings and Sidney; two other riverside sites, Hinsdale and Rookery WMAs, were purchased along the Milk River in the mid-1970s. In 1982, 666 acres was acquired along the Clark Fork River west of Missoula. All eight of these sites are now contributing to our understanding of streamside environments and their special management requirements.

The 1,622-acre Ray Kuhns WMA along the west side of the upper Flathead Valley, the 1,179-acre Nevada Lake WMA on the east side of the Garnet Range, and the Bridger Mountain WMA north of Bozeman are all serving wintering deer populations and encouraging small elk herds.

Wildlife Needs—No. 1 Priority

The needs of wildlife are primary on all of the WMAs. Most of the big game wintering areas are closed to public access from the end of the general hunting season until May to minimize disturbance. Some of the wetlands are closed during the spring nesting season, from April to July. Otherwise, the areas are open, and the public is welcome. A few of the WMAs have picnicking and camping areas. Most provide seasonal opportunities to watch, photograph, and otherwise enjoy wildlife. Just about all of the WMAs are open for hunting. Some of the wintering areas, however, do not offer the best hunting since the game is still at higher elevations during the general season in late October and November.

Some of the larger WMAs are the sites of university and DFWP research projects. These areas provide an opportunity for the department to put into practice the latest wildlife research findings, unencumbered by most of the constraints that affect private individuals, corporate land managers, and multiple-use agencies. In this way, the department can demonstrate all across Montana that wild animals are compatible with certain timber practices, travel management schemes, and grazing programs, and show—on the ground—what is required to keep a wildlife resource healthy.

Also important, the WMAs provide a graphic example of the importance of the wildlife support system: the soil, water, and vegetation. Through the WMAs, the department can show that it is possible to reclaim an abused site.

Healthy, But Fragile

As healthy as our big game resource is today and as beautiful as Montana looks, it has changed dramatically since David Thompson and Meriwether Lewis sat on the banks of the Kootenai and Missouri rivers. In Soil Conservation Service reports, one can note many places where we have lost the fragile and valuable topsoil. Creeks that used to run strong and clear no longer run or are no longer in a condition to support native wildlife. In too many places, stands of perennial grasses have been replaced by less nutritious annuals.

Simply fencing an area is not the solution. We have places on the Blackfoot/Clearwater WMA where livestock have not grazed for 40 years that are now being invaded by knapweed. The reason? In the first 40 years of this century, the area lost a good deal of its organic soil and now the bare ground between the bunchgrass will support only tap-rooted plants.

For centuries, Montana's native vegetation developed under a regime of wildfire and periodic grazing by wild animals. Many perennial plants have not stood up well to intensive annual grazing by cattle and strict fire control. On the Sun River, Mount Haggin, and a few other WMAs, the DFWP is experimenting with grazing programs that promise to improve native grasses and add organic material to the soil. How long does it take to bring deteriorated land back? Years, maybe decades. The point is, the department wants to show it's possible. It's also necessary, if Montana's big game populations are to have a long future.

Wildlife is a natural product of a healthy environment. Given a little space, the animals will be there if we take care of this support system. We have already demonstrated it to a limited degree.

What about the future of the WMA program? Wildlife-oriented recreation has played an important role in the state's economy, and it will probably play an even greater role in the future. The future of elk and waterfowl is tied to protecting and improving winter range and wetland habitats.

The DFWP's role in producing game populations depends on the will of the sportsmen and landowners and the will of the Montana Legislature. With purchase of another one-tenth of 1% of Montana, the DFWP should be able to increase elk production by 8% to 12% and waterfowl production by 3% to 4%. The DFWP could more intensively manage the lands it has now and also increase production. This assumes, of course, that the other 99.6% of Montana is managed at least as adequately as it is now.

Funding of the wildlife management area program has never been dependable. The federal excise tax revenue always depends on the state of the economy and expenditures for recreation. Sometimes land is offered, and little money is available to buy it. At other times, money is available for land, but not for operation and maintenance.

One idea under discussion is establishment of a wildlife fund that would be financed by an earmarked portion of resident and non-resident licenses. The legislative checks on public land purchases would still apply. With the fund, the state would have the flexibility to consider all offers—regardless of size and timing.

The idea parallels a successful 12-year-old program that has worked well in providing fishing access across Montana. Since 1974, $1 from each resident fishing license and $5 from each non-resident fishing license have been earmarked for a special fund. Fifteen percent of this money is available for operation and maintenance of fishing access sites. The balance is used to acquire fishing access areas on Montana's streams. This rather painless, user-financed method has been responsible for more than half of the 200-plus state-owned fishing access sites that we enjoy today.

The soon-to-be half-century-old Federal Aid in Wildlife Restoration Act in general, and its land acquisition program in particular, have had a lot to do with the good position our big game resource enjoys today. It would be wise to continue to invest in a program that has brought us so much success. ■

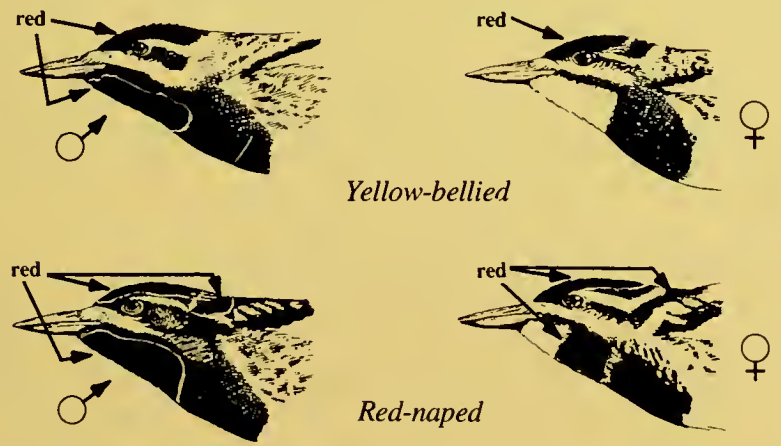
YELLOW-BELLIED AND OTHERWISE

The American Ornithologists' Union (AOU) has altered the name of a nongame bird that is the brunt of many jokes. The group renamed the western race of the yellow-bellied sapsucker *(Sphyrapicus varius nuchalis)* in July 1985. The union gave the "race" full species status, and the new name of red-naped sapsucker *(S. nuchalis)*. As with most taxonomic changes of this sort, the AOU's decision was based on research showing that populations differed genetically as well as in appearance and geographic distribution.

The primary difference between yellow-bellied and red-naped sapsuckers is in the plumage of the head and throat (see illustration). In both sexes, the yellow-bellied sapsucker has a well-defined white mark or stripe which begins behind the eyes and encircles the nape of the neck. Both male and female red-naped sapsuckers have similar white feathers behind the eye, but red tips on the nape feathers give these birds a distinct red patch behind the head (a "nuchal" patch—hence, their scientific name). Female yellow-bellied and red-naped sapsuckers have distinctive throat patterns. The yellow-bellied's throat is entirely white, while the throat of the female red-naped sapsucker has a variable amount of white near the bill but is primarily red at the base (toward the breast).

Genetic research which led to this species split showed that red-naped sapsuckers are actually more closely related the red-breasted sapsucker *(S. ruber)* of the West Coast than they are to the yellow-bellied. (Taxonomists once considered the red-breasted sapsucker a race of the yellow-bellied.) Red-breasted sapsuckers have an entirely red head and breast; the extensive red coloration is caused by red pigment in the feather tips. In spite of the very different appearance of red-breasted sapsuckers, coloration of the feathers beneath the red is in the same pattern as red-naped sapsuckers. This further indicates these are closely related, very recently evolved species.

Despite their genetic similarity, however, red-naped and red-breasted sapsuckers hybridize at a rate of only 6% in the small area of Oregon, Nevada, and California where they co-exist. Hybrid offspring are fertile, but by comparing the number of hybrids in extensive collections of sapsuckers, researchers found that social or habitat factors limit the number and success of hybrid matings.



The red-naped sapsucker breeds throughout the Rocky Mountain region, from southern British Columbia and Alberta south to Nevada and Texas; it is the species which breeds in Montana. Yellow-bellied sapsuckers breed from eastern Alaska east and south through Canada to North Dakota and the eastern United States, and south to North Carolina. They pass through Montana during migration, but their relative abundance has not been assessed.

Montana birders should be alert to the difference between these species during migration. Plumage of the various sapsuckers discussed in this article is well illustrated in National Geographic's "Field Guide to the Birds of North America."—*Daniel Casey, wildlife biologist, Kalispell*

MORE ON WOODPECKERS

Sapsuckers are not the only species of woodpecker whose name has changed; the sixth edition of the AOU checklist also renamed the two species of three-toed woodpeckers which occur in Montana.

Hiking through any recently burned area of western Montana is probably the easiest way to locate one or both species of Montana's three-toed woodpeckers (other species of woodpeckers have four toes on each foot). The three-toed woodpecker *(Picoides tridactylus)*, formerly known as the northern three-toed woodpecker, is the more common of the two. It measures from eight to nine and one-half inches long. The adult male is distinguished by the yellow cap on his forehead, which is absent in the female. Both sexes have a white back with black bars across it and heavily barred sides. The black-backed woodpecker *(P. arcticus)*, formerly the Arctic or black-backed three-toed woodpecker, is slightly larger than the preceding species. The adult male also has a yellow cap, while the female doesn't. However, both sexes have soot-black backs and barred sides.

Both species are found in the boreal forests of Alaska and Canada and range south through the mountains of the western United States to Arizona and New Mexico, and east to northern parts of the Midwest and New England. They inhabit coniferous woodlands—Douglas-fir, western larch, and cedar. These birds don't migrate; in the middle of winter, when everything else seems to be at a standstill, they are out and about pecking away for their food.

Although three-toed woodpeckers aren't common in the lower 48 states (they are abundant in Alaska and northern Canada), quite a few of them inhabit forest burns. Like other species of woodpeckers, they feed on the large populations of bark and woodboring beetle larvae in fire-killed trees. The woodpeckers get at the larvae through angled blows to the scorched bark, and

you can often see piles of bark chips below trees where they have worked. They use their tongues to extract larvae from crevices. Other food includes spiders, weevils, nuts, berries, and the cambium layer of trees.

Studies show that both species move into a burn during the first year after a fire; they usually remain through the third or fourth year, depending on the size of the burn, and often nest there. In April, they begin excavating their nests, usually from five to 50 feet up in the trunk of a dead tree. The nest cavity is 10 to 15 inches deep. The female lays four white eggs, and incubation lasts about two weeks. The plumage of immature woodpeckers is duller than that of their parents, with some yellow in the crown which disappears in the females after they mature.

Three-toed woodpeckers are normally silent, but occasionally utter a short "PIK." The black-backed woodpecker also sounds a loud "Tschuck" which can be easily heard. They are especially noisy during breeding season when they can be heard drumming on dry snags.

One likely spot for black-backed and three-toed woodpeckers is in the Mount Sentinel burn near Missoula. They appear to be so busy with their work that they pay little attention to what's going on around them so they are easily approached and seen. Look for three-toeds in small flocks of two to six birds; black-backed woodpeckers aren't as common and they are usually seen individually or in pairs.—*John McNeal, Billings*

PROGRAM UPDATE

On July 24, a Nongame Program Review was conducted in Helena to provide communication between conservation organizations and the Department of Fish, Wildlife and Parks. Attending were department personnel and representatives from the Audubon Society, The Nature Conservancy, the Montana Wildlife Federation, and the universities. Purpose of the meeting was to ensure consistent promotional strategy and to provide feedback to those interested in the progress of nongame projects. An informal committee was established to meet about four times per year and to serve as a forum for coordination, liaison, and information exchange.

Those attending received a brief description of the nongame program activities supported by check-off dollars:

- **Bluebird conservation:** Primarily private citizens are running the bluebird nest box program, with the department serving an "extension service" role. As a 1989 Montana Centennial Project, plans include developing a cross-state bluebird route along Highway 200.
- **Raptor survey routes:** Current trends show slightly declining raptor populations, but they are still above the 10-year average. Species affected by drought, specifically Swainson's hawks and northern harriers, are responsible for the lower population figures. Those better adapted to dry conditions are increasing. Eighty percent of the routes were surveyed in 1986, an improvement over the last several years.
- **Species composition on wildlife management areas:** Researchers have inventoried the Sun River, Ear Mountain, Judith, Freezout, Canyon Ferry, and Blackfoot-Clearwater Wildlife Management areas; the inventory at Mount Haggin is under way, and areas in eastern Montana are next.
- **Nature trails:** Sites have been selected and preliminary planning done for nongame-oriented nature trails at Lewis and Clark Caverns and Makoshika State Park.

Committee members reviewed potential projects for fiscal years 1987-91. Members determined potential projects to be submitted for federal aid from a combination of (a) existing, ongoing projects, (b) the department's strategic plan, and (c) the governor's executive planning process. Projects discussed included: (1) nongame inventory on department-owned lands [existing], (2) population status of the western big-eared bat, (3) bat survey in south central Montana, (4) statewide raptor survey route system [existing], (5) bluebird conservation [existing], (6) status of the mountain plover, (7) status of the upland sandpiper, and (8) colonial nesting water bird inventory.

Those attending received a summary of current and projected performance of the nongame check-off for 1985. Projected totals are down somewhat from the first two years, perhaps due to the addition of other check-off categories on the tax form. Conservation groups are ready for a more vigorous and better coordinated promotion campaign during the 1987 season. New ideas include a stand-up card for the desks of certified public accountants and a message on grocery bags.

LIBERATED SHOREBIRDS

One of Montana's nongame birds is liberated in the sense of the female's rights and responsibilities. The Wilson's phalarope, a small, elegant shorebird that nests on the grassy borders of shallow lakes, marshes, and reservoirs in Montana, enjoys a role reversal unusual in the animal world.

Unlike most bird species, female phalaropes are larger and more brightly colored than males. The female's breeding plumage has a striking reddish-brown line down the side of the neck and a rufous (reddish) patch on the wing. Males have more subdued colors year-round. The female phalarope also initiates courtship and apparently chooses her mate.

After the female lays her eggs, the male phalarope incubates them and raises the young birds by himself. Female phalaropes seem to have their liberated life style well worked out, but biologists still don't know why phalaropes have adopted this unusual mating system.

Wilson's phalaropes visit Montana in summer, from the first week of May until September. They winter in Central and South America.—*Tom Lemke, wildlife biologist, Kalispell*

GOOD READING

Audubon Wildlife Report 1985, edited by Amos S. Eno and Roger L. DiSilvestro, National Audubon Society, 950 Third Ave.; New York, NY 10022, 1985, 650 pages, $16.50. A field guide to government natural resource agencies and their programs.

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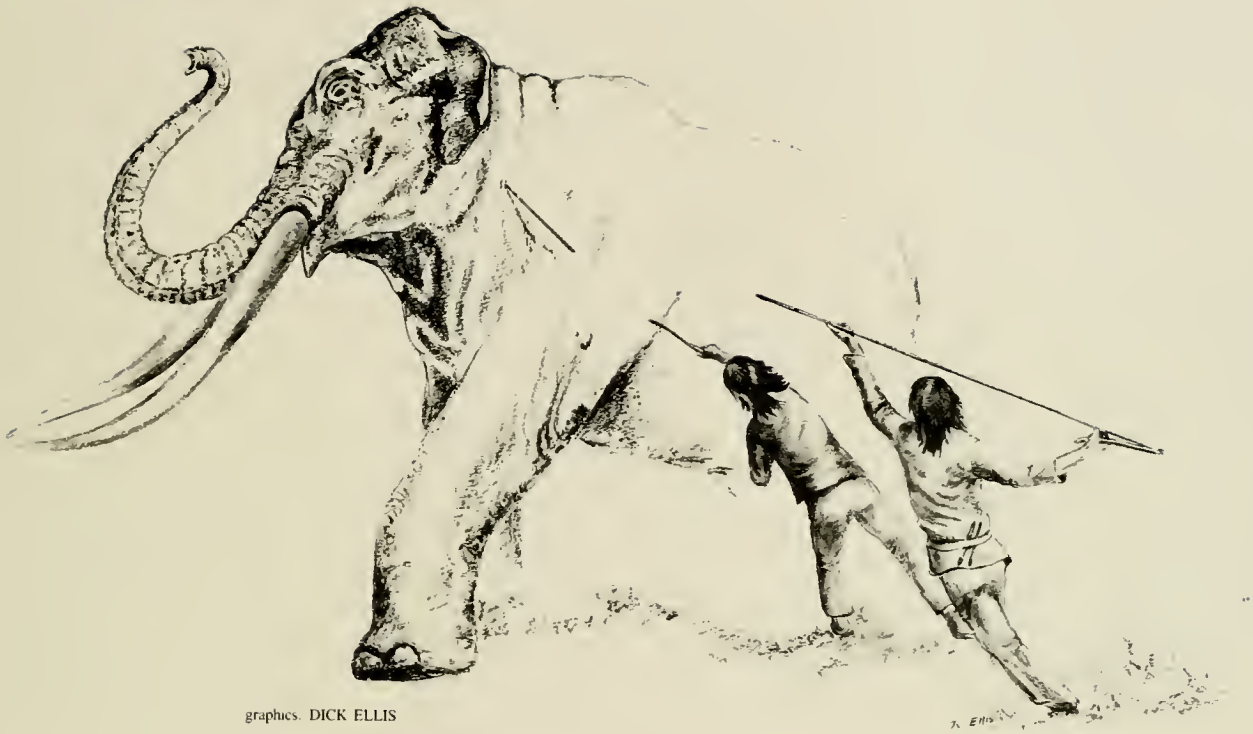


graphics. DICK ELLIS

MOMENTS IN MONTANA PREHISTORY

In Search of Early Elephants

by Les Davis

Mammoth tusks in Montana? They could be the subject for a "Ripley's Believe It or Not" segment. But believe it! In July 1966, Joe Walker, a farmer from the Lindsay, Mont., area was driving his combine along a Dawson County road northwest of Glendive. He saw something whitish which a midsummer cloudburst had washed down a borrow pit. He examined the material, which resembled styrofoam, and recognized it as pieces of a fossil tusk.

Dawson County Commissioner Don Gibson relayed news of Walker's find to Montana State University anthropologist George W. Arthur and MSU paleontologist/geologist Dr. William McMannus. They visited the location later that year and concluded that Walker had found pieces of a mammoth tusk exposed by erosion and washed downslope from where the skeleton was found. They spotted agate fragments nearby, which raised the possibility that the mammoth had been killed by Stone Age hunters. Arthur obtained funds from the MSU Endowment and Research Foundation to explore that possibility. As a result, most of the Lindsay mammoth skeleton and tusks (named for the area in which Walker found it) were recovered from the spot in which the animal had died more than 10,000 years ago.

While a pre-doctoral student in archaeology at the University of Calgary in 1967, I was hired by MSU to direct the Lindsay mammoth recovery project. During 30 days in July and August, six students and I excavated and recorded the site. With help from MSU student Larry Lahren from Livingston, we cast and delivered the skeletal remains and geological samples to the university. The Lindsay mammoth and site (24DW501) are interpreted in the Museum of the Rockies today, but research continues.

The Lindsay specimen is an Imperial mammoth *(Mammuthus imperator)*, identified, aged, and sexed by Dr. Jeffrey J. Saunders, Illinois State Museum. It is one of the earliest of the largest New World Ice Age elephants. Imperial mammoths, once widespread in North America, had high-crowned molars—numerous plates of hard enamel alternating with softer dentine—that served efficiently as vegetation-grinding surfaces. The Lindsay mammoth, a mature bull about 45 years old at death, towered nearly 14 feet to the top of his skull, and he weighed tons. The 150-pound right tusk measures nine feet long along the outside of the curve and is eight inches in diameter at its juncture with the skull.

The Lindsay mammoth ranged, and eventually perished, in gently rolling uplands in the short-grass plains of east central Montana. Radiocarbon dates from mammoth bone and tusk place

Fig. 1—The Lindsay mammoth excavation site northwest of Glendive. The exposed bones, teeth, and tusks are still in position (MSU photo).

its time of death between 12,000 and 10,700 years before present (B.P.), possibly earlier than the Clovis Complex life span (from 11,500 to 11,000 B.P.), but more likely equivalent in age with Clovis. The area was probably cooler and more moist than today, although the warming and drying that caused the glaciers to melt were well advanced in the Northern Plains by that time.

Remains of the Lindsay mammoth were discovered 12 miles south of the glacial moraine of the much earlier Late Pleistocene continental ice sheet that extended across northern Montana. Long after the glacier had retreated northward, and after glacial meltwater lakes had dried up, winds scoured, lifted, and deposited fine lake silts downwind across the countryside. The Lindsay mammoth, which died on one such surface, was then buried beneath four feet of silt that helped preserve the skeleton for thousands of years until its recent discovery (Fig. 1).

Some bones of the Lindsay mammoth were found "arranged" in ways unlike those which result naturally from the decomposition, deterioration, and dispersal of carcass parts, downslope erosion, or from large predators feeding, gnawing, and consuming. For example, one upper hind leg bone was lying across the other, both atop ribs from the forward part of the chest cavity—a pile of refuse that people might have stacked.

A blow to the mammoth's mouth had dislodged two upper molar plates which came to rest 15 feet away near the vertebrae of the spinal column. The jaw was turned nearly 130 degrees away from the position of the much heavier skull, and the fronts of the molars had been impacted. The upper end and side of both of the upper front leg bones had been battered and opened, perhaps to gain access to protein-rich marrow and grease inside. None of the pieces of bone so removed was found during excavation of the bone bed, indicating removal from the death bed by one agent or another.

We found eight sandstone blocks beneath and beside the modified upper limb bones, the spinal column, and the jaw. Researchers know neither the origin nor the purpose of these blocks. Together, these blocks weigh less than 10 pounds. The edges show none of the crushing or breaking that might result from early peoples using the blocks to break massive bones or to chop through tendons and tissues of animals as an aid to dismemberment or butchering.

The damage to the mouth below the trunk could have been sustained during combat with another mammoth, so the blow need not have been struck by hunters. No recognizable stone, bone, or other artifacts were found in the mammoth bone bed. Michael Wilson, collaborating University of Calgary zooarchaeologist, had noted apparent cut marks on some bones. Carnivores had gnawed the ends of other bones before they were buried and protected by the wind-borne silts.

Clovis Complex hunters at other North American sites sometimes used bone projectile points. If the Lindsay mammoth met his death that way, the bone points used to kill him may have disintegrated or been retrieved. If stone points had been used, they, too, could have been carried away when the hunters departed the carcass. If hunters had chanced upon a badly wounded mammoth, or one that had recently died, they could have scavenged that carcass selectively, leaving behind only a few indications of their activity.

If the Lindsay mammoth was killed or scavenged by man, this

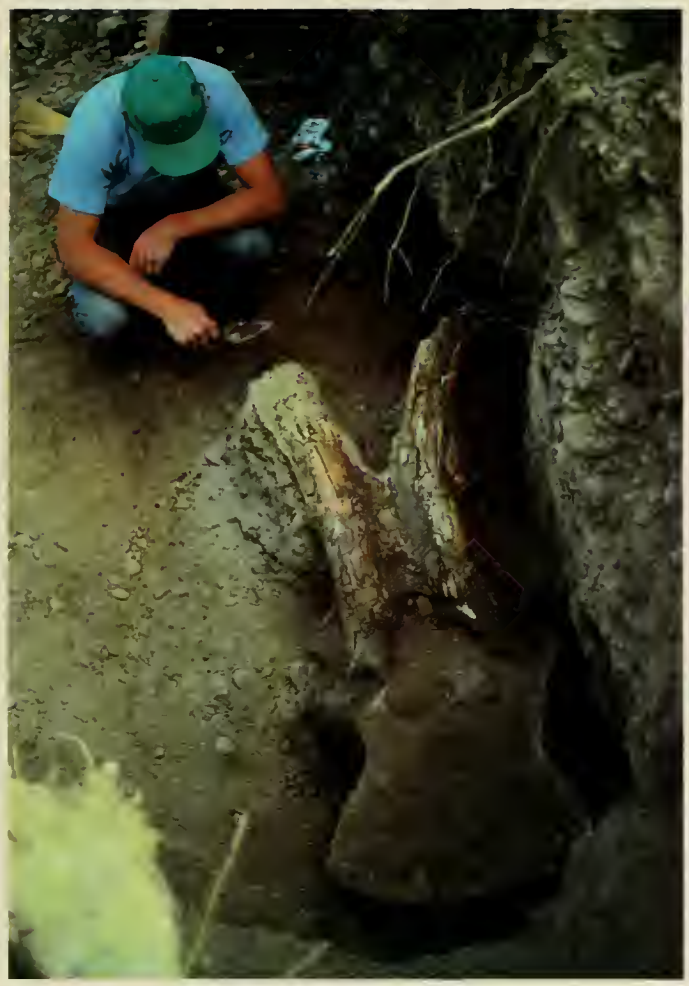
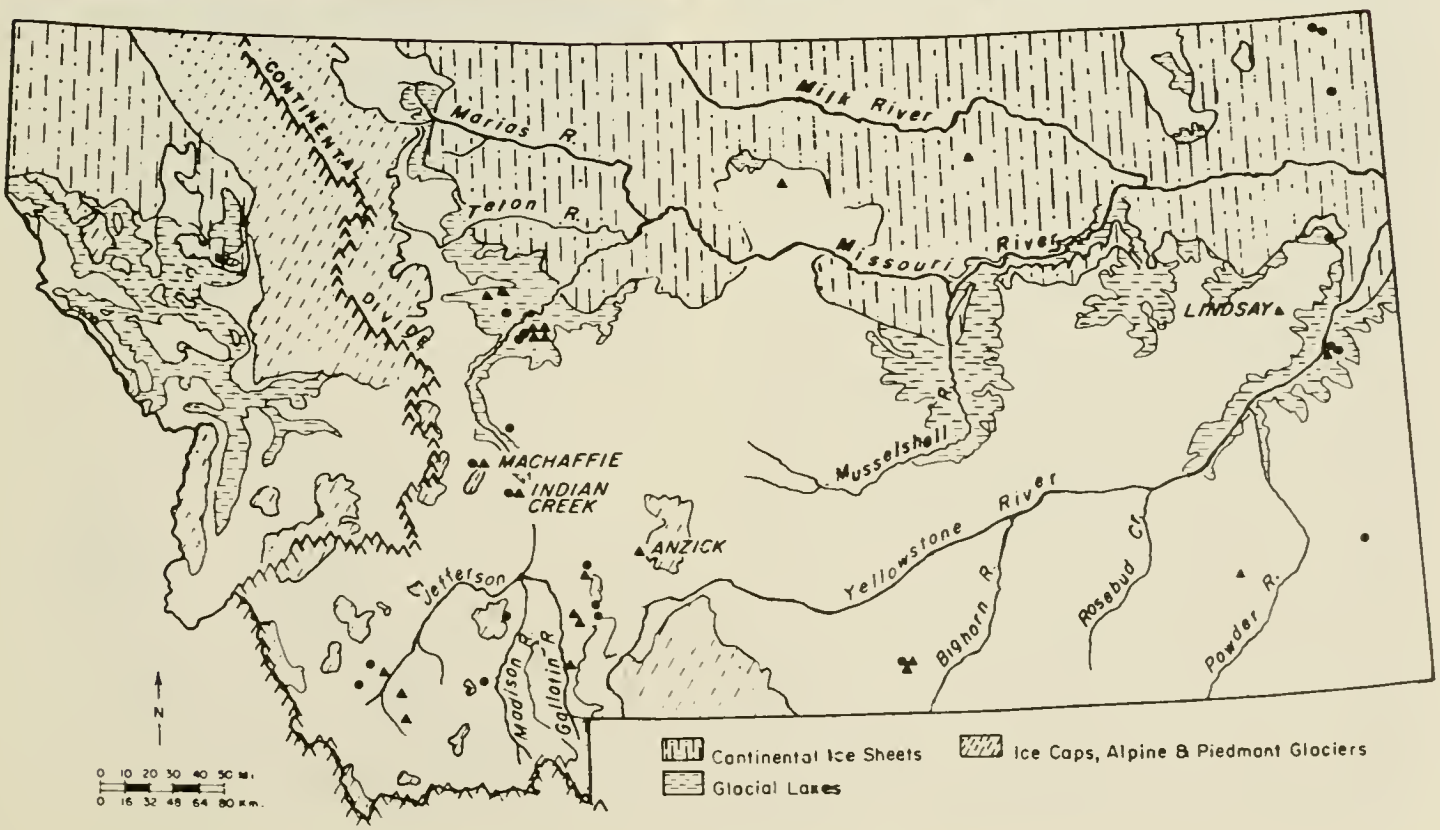


Fig. 2—The skull and attached tusks of a mammoth were found in 1975 north of Saco, Mont., along the Milk River during a gravel removal operation. No evidence of human association was found. Because the bone was so degraded, the bone sample could not be radiocarbon dated (MSU photo).

Fig. 4—Folsom Complex projectile points from the Sun River-Cascade area of central Montana, west of Great Falls (MSU photo; artifacts loaned by John N. Byrd; Canyon Ferry, Mont.).

Fig. 3—Locations where Clovis Complex points have been recorded in Montana are indicated by black triangles, while Folsom Complex point locations show as black circles.



site would be the earliest yet radiocarbon-dated presence of mammoth hunters in Montana. If so, the big game hunting adaptation followed by 400 succeeding generations of prehistoric peoples in the Rocky Mountains and High Plains of Montana was indeed established a very long time ago. In any case, such specialized big game hunters set the stage for later peoples who, in their turn and in their own ways, added their remains to our slowly emerging knowledge about Northwestern Plains and Rocky Mountain prehistory.

* * * * *

The molars, bones, and tusks of extinct New World Pleistocene elephants have been found in river gravels (Fig. 2) and eroding out of stream banks around Montana. Mammoths and other giant Ice Age herbivores, and several kinds of carnivores, drifted into North America from Asia via the Bering Land Bridge a million or more years ago. Mammoth hunters from Siberia, *Homo sapiens* of Mongoloid stock, trailed their prey across this surface and into the New World many thousands of years later. By at least 15,000 years ago, small bands of mammoth-hunting peoples had adapted to the climate and resources in the unglaciated interior of Alaska. Still later by a few thousand years, their descendants breached the continental glacial ice barrier that stretched across North America, perhaps via a north-south ice-free corridor or by following the coastal plain, which took them eventually to the cool, well-watered grasslands of Late-Glacial Age Montana.

Although supporting evidence is strictly limited, early hunters were preying on mammoths by about 11,500 B.P. at scattered Montana locations. These hunters are called "Clovis" after the community of Clovis, N. M., near a site where distinctive projectile points were discovered along with mammoth bones and tusks. Clovis hunters typically killed mammoths with spears or with darts propelled by a spear thrower. Clovis hunters used large points from which they pressured off one or more long, thin flakes (flutes) from the base toward the point on both surfaces. That technique thinned the base and the center of the lower half of the point, aiding attachment to the shaft.

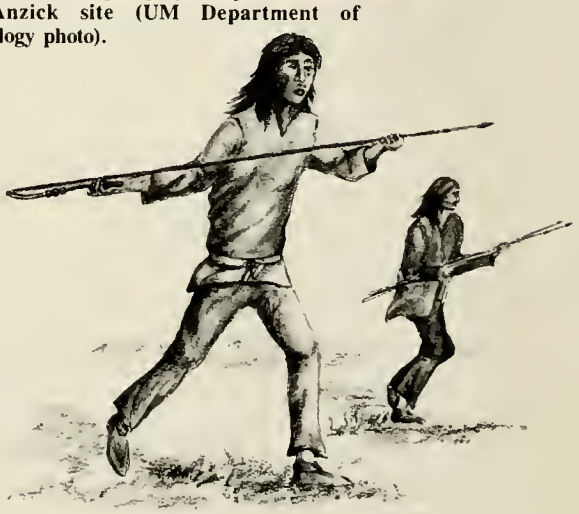
Clovis points picked up nowadays may indicate that elephant hunters had once passed nearby. Unfortunately, then, as now, inquisitive individuals sometimes picked up interesting relics and carried them off, to be lost again somewhere else where Clovis hunters had never been.

The Clovis archaeological complex spread rapidly throughout the United States, Canada, and northern Mexico before it vanished around 11,000 B.P. Somewhat later, mammoths and more than 30 other North American Ice Age giant species became extinct. Clovis is still the best known, undisputedly accepted, early prehistoric human presence in North America, although earlier cultures have been asserted.

Clovis points are not common in Montana, but they do occur east of the Continental Divide in widely separated areas where mammoths were hunted, slain, and utilized (see the black triangles on Fig. 3).

Descendant from and replacing Clovis was the Folsom Complex named after a site near Folsom, N.M., where smaller fluted points were found along with bison they had been used to kill (Fig. 4). From 11,000 to 10,500 B.P., these big game hunters preyed on giant bison and other herbivores. Folsom points, fluted over their entire length, are much smaller than Clovis points. In Montana, Folsom points are found in localities that once supported herds of giant bison (see the solid black circles on Fig. 3).

Fig. 5—A Clovis Complex projectile point from the Wilsall-Anzick site (UM Department of Anthropology photo).



Both Clovis and Folsom peoples were active in Montana north of the southern margins of the continental ice mass before the ice sheet melted back to its origin around Hudson Bay (Fig. 3). However, glacial ice had long since melted and glacial lakes had dried up before early people occupied the area. Mapping the locations of known fluted points provides some idea of the distribution of early Post-Glacial human occupants of Montana.

While nearly two dozen Clovis points from scattered locations are known, finds of undisturbed buried Clovis artifacts are rare in Montana. Recently, a Clovis point was excavated from 24 feet underground on a 11,000-year-old surface. It was recovered from private property at the Indian Creek site in the Elkhorn Mountains near Townsend. That Clovis point was made locally from a type of quartzite that crops out in the nearby Limestone Hills.

* * * * *

Another discovery was made in May 1968, nearly 300 airline miles west of Lindsay, near Wilsall, Mont., on private property. While using machinery to collect fill from below a rocky ledge near the Shields River, Ben Hargis and Calvin Sarver unearthed more than 100 flaked stone, bone, and antler artifacts, and a few skeletal parts of humans. These items had been hidden beneath slope wash and rockfall. Red ocher (iron oxide) had been smeared or painted on the artifacts and bones, probably for ritual purposes. Of most immediate significance were five complete Clovis points. And two others turned up later!

Anthropologist Dr. Dee C. Taylor led a University of Montana crew to the location later that year after being notified of the find by C. Alan Carmichael, MSU anthropologist. At the end of two weeks of fieldwork, the crew had not found the spot in which the materials had originally lain. The most obvious explanation is that the bones and artifacts, covered with ocher, originally had been deposited together by early people. Bones of recent bison found in the disturbed fill complicated efforts to redefine the original context of the artifacts and other materials. The bison bones were radiocarbon dated at about 800 B.P.

Thus, the first Clovis Complex human skeletal materials known, apparently with Clovis artifacts, bone tools, and bone and antler-working technology, could not be proved associated and, thereby, contemporaneous. Nor did later fieldwork by Livingston archaeologist Dr. Larry Lahren successfully relocate the original position of the cached remains.

The Wilsall-Anzick site has been called a Clovis cremation site because of the fragmentary, ocher-covered human bones and because the artifacts are regarded as burial goods; however, the absence of ash and charred skeletal parts and any evidence of the use of fire makes that problematic. Full publication of these studies of materials in the near future is awaited. This important collection is exhibited for the public in the Park County Museum in Livingston.

* * * * *

Circumstances in which the Lindsay and Wilsall-Anzick sites were discovered may well forecast the way in which future glimpses into very early human activity in Montana will occur. Obviously, not all cultural remains are buried as deeply or are as well concealed from curious eyes as those from the Indian Creek site. The Lindsay mammoth lay at rest only a few inches beneath a county road, while the Wilsall-Anzick cache, originally at the base of an overhanging rock outcrop, had been obscured by slope wash and rockfall.

The Lindsay mammoth was discovered because road construction removed most of the sediments overlying parts of a buried skeleton, which was later revealed by erosion of the borrow pit and recognized as a fossil. The Wilsall-Anzick Clovis materials were revealed inadvertently during removal of rock talus and were recognized as artifacts by the workers who went back and recovered other remains from the disturbed debris. The Indian Creek Clovis point was excavated by troweling during a problem-oriented, university-sponsored investigation. However, had 100 years of channel dredging for gold not lowered the stream gradient sufficient for deep erosion, those buried occupations, in place with artifacts and animal remains, would still be unknown.

By way of comparison, Folsom Complex projectile points have been excavated in original context at only two Montana sites, both in the upper Missouri drainage: in stream alluvium at the MacHaffie site (24JF4) southwest of Helena, and at Indian Creek, 20 airline miles southeast of the MacHaffie site. Most Folsom points are found as isolated surface finds at scattered Montana locations. It is unusual that known Folsom points barely outnumber Clovis points; more Folsom points should have been found since they are more recent. It is remarkable that so many Paleoindian fluted points are known today, since many picked up during the severe erosion in the 1930s in central Montana were never reported and have long since left Montana.

Even though we do know that Clovis hunters were active in early Montana, we still cannot realize the implications of their presence. Unfortunately, most available evidence lacks original context. These physical clues to prehistoric human activity are often subtle. If citizens who find them contact archaeologists, the longed-for combination of Clovis Complex artifacts and human skeletal remains—along with the bones, teeth, and tusks of mammoths they hunted—may eventually be found together. Prime evidence such as this is needed if the life and times of Paleoindians who enjoyed the Montana outdoors of the truly long ago are to be more fully appreciated. ■

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BIG BUCKS AND BIG BULLS: A STATUS REPORT

In recent years, some deer and elk hunters have expressed concern that "there aren't as many big ones as there used to be." As a result, in 1985 the Montana Fish and Game Commission asked the department to evaluate the status of "big bucks and bulls" available to hunters. This article, compiled by the Wildlife Division, summarizes that report.

At the outset, it should be understood that hunting regulations alone cannot completely address the "trophy" issue. Other factors, such as food, genetics, cover, landowner tolerance, weather, and economics all play important roles in determining the status of big bucks and bulls. A separate report could be written on each of these topics; however, this article focuses on hunting regulations, the factor over which the Department of Fish, Wildlife and Parks (DFWP) has the most control. First, let's look at the deer situation.

"Big" Is in the Eye of the Beholder

What is your definition of a big buck? Is it a buck whose antlers qualify for the Boone & Crockett (B&C) record book? Or one whose antlers rank high in the official records of Montana big game? To some, a big buck may be simply one bigger than any they have previously shot. Whatever the case, it is obvious that one's definition is of paramount importance in discussing the issue.

To put things in perspective, the largest typical Montana mule deer ever recorded ranks 87th in the B&C records. Only 10 of 318 (3%) typical mule deer in B&C records are from Montana. The largest non-typical mule deer is 35th in the B&C records, and only 15 of 254 (6%) non-typical mule deer in B&C records are from Montana. The largest Montana white-tailed deer fare somewhat better, ranking 6th and 13th for typical and non-typical heads, respectively. Overall, though, only 18 of 456 (4%) typical and 16 of 313 (5%) non-typical white-tailed deer from Montana are in the B&C record book.

For whatever reasons, Montana does not produce many world-class mule deer. Does this mean that Montana does not have its share of big bucks? Again, it comes back to how a person defines a big buck. But for the purposes of this article, let's say that the minimum requirement for a mule deer in the big buck category is that it is 3½ years or older with at least four antler points on each side. This is simply a mature, healthy buck—a good animal by most standards. While the discussion that follows pertains primarily to mule deer, many of the same principles also apply to whitetails.

Requirements for Producing Big Bucks

Three factors are known to control the size of an individual buck's antlers: (1) nutritional status, (2) genetic makeup, and (3) age. A population of deer will have lots of big bucks if the male segment consists of many mature, well-nourished, genetically superior animals—exactly the kind of deer most hunters would like to see in their favorite areas!

Unfortunately, biologists cannot control all the factors necessary to produce lots of big bucks in wild populations. Hunting regulations may help to improve a buck's nutritional status by keeping the deer population in line with what the habitat can support. An abundance of high-quality forage is necessary during the summer and early fall if a buck is to have the added energy needed to grow a large set of antlers.

Hunting is frequently cited as the overriding factor controlling the number of mature bucks in deer populations. While hunting certainly can have an influence, its effect is not the same in all situations. For several years, pre-hunting season buck:doe ratios have averaged 50:100 in central Montana's heavily hunted Missouri River Breaks population. What may be surprising to some is that this ratio falls between those recorded for unhunted

populations in Glacier National Park (43 bucks:100 does) and the National Bison Range (66 bucks:100 does). Similarly, the post-season ratio along the moderately hunted west slope of the Bridger Mountains in southwestern Montana has averaged 25 bucks:100 does over the last 10 years, while the ratio for the lightly hunted 16-Mile population in the same Bridger Mountains has averaged only 10 bucks:100 does. Other moderately hunted mountain ranges, such as the Garnet Range in western Montana, have only five bucks:100 does in post-season populations.

At least five interrelated factors other than hunting can affect the numbers and availability of big bucks in Montana deer populations: (1) buck mortality patterns, (2) fawn survival patterns, (3) buck age structure, (4) weather, and (5) buck habitat.

Buck Mortality Patterns

It is unlikely that there are any wild populations of mule or white-tailed deer in North America in which adult bucks and does occur in equal numbers. Information from several sources shows that even without hunting, the annual mortality rate for males is twice that of females. In the Bridger Mountains, the natural life expectancy of males seldom exceeds eight years, whereas females often live 12-14 years.

Bucks endure added stresses during the breeding season because they move constantly, spend little time feeding, do not select nutritious forage when they do feed, and suffer injuries in dominance fights. The result is that adult bucks enter the winter in worse condition than females, and thus tend to suffer higher winter mortality. This is particularly true for the largest, most dominant males. The more severe the winter, the more pronounced this effect may be. Management strategies designed to "stockpile" big bucks are generally ineffective for long periods in northern latitudes.

Fawn Survival Patterns

At any point in time, the number of bucks or does in a deer population is directly related to the ability of fawns to survive during each of several preceding years. Fawn survival patterns tend to closely reflect environmental conditions. In eastern Montana, where the climate is extremely variable, fawn survival patterns vary accordingly. The recent drought resulted in poor fawn survival for several years in most of eastern Montana, followed by a corresponding downward trend in population numbers. In western Montana, environmental conditions are more stable and fawn survival patterns tend to be less variable. Thus, population fluctuations in western Montana are not as severe as those in the eastern part of the state.

Buck Age Structure

The combination of buck mortality patterns and fawn survival in a population determines the number of bucks in the various age categories—i.e., the buck age structure. Thus, the *present* buck age structure is a result of conditions in *past* years.

Because mortality rates for healthy, prime-age bucks remain relatively constant except in extreme conditions, it is the pattern of fawn survival in preceding years that largely determines the numbers of bucks in the various age categories now. Years of high fawn survival result in larger numbers of mature bucks several years down the line. Likewise, years of poor fawn survival, such as recently occurred in much of eastern Montana, will mean fewer big bucks in the next three to five years.

Weather

Weather affects the number of big bucks in a population through its impact on adult mortality and fawn survival. It also affects the quality of antlers—i.e., mature bucks will probably produce smaller antlers in years of poor forage than in good years.

Weather also affects the availability and observability of big bucks in a population. Some mountain mule deer populations move to winter ranges in rugged, high-security habitat. In these areas, weather conditions can strongly influence the hunter's ability to successfully harvest or even see big bucks.

To illustrate, during 1976 in the Bridger Mountains, large-antlered bucks were abundant. However, warm, dry weather during the fall resulted in poor buck hunting conditions, and most hunters complained of a shortage of bucks. One year later, a combination of severe weather, early migration to winter ranges, onset of the rut, and high hunter turnout resulted in the harvest of an estimated 60% of the adult male population. This occurred in what is normally high-security deer habitat.

Buck Habitat

Long-term studies in the Bridger Mountains show wide variation in buck:doe ratios among the seven mule deer population units that have been identified. This variation seems to be poorly correlated with the level of hunting pressure. Moderately hunted populations along the west slope have higher buck:doe ratios than some lightly hunted east slope populations. One factor that might be important in causing this difference is the availability of "buck habitat."

Adult does with fawns dominate the social structure of deer populations, except during the breeding season, when large males become dominant. When not crowded onto winter ranges, females generally occupy the more favorable habitats, with bucks often found in areas having fewer does. The west slope of the Bridger Range contains a lot of high-elevation (subalpine-alpine) habitat, whereas the east slope has a more limited subalpine-alpine zone. Does in both areas tend to occupy the mid-elevation timbered zone, while fewer bucks live in this habitat type. Bucks on the west slope are able to utilize the subalpine-alpine zone, but bucks on the east slope apparently have few places to go and may be forced to leave the population altogether. Studies have shown that young bucks leave east slope populations for other areas at a higher rate than that recorded for west slope populations. This "drain" on the buck population could contribute to the lower buck availability observed on the east slope. Similar situations may exist in other mountain foothill habitats in Montana.

The Supply of Big Bucks

Data indicate that there are as many big bucks in Montana now as at any time in the past. More bucks were harvested statewide in 1983 and 1984 than in any other year except 1957. The Montana big game records show that many large bucks (both mule deer and whitetails) have been taken in the last 10 years, especially in 1983 and 1984.

If there are as many big bucks now as in the past, why do many hunters today perceive a lack of big bucks? This perception is indeed valid—it is the result of increased numbers of hunters and the consequent reduced probability that any given hunter will find a big buck. The number of deer hunters in Montana has almost doubled since 1950. Obviously, the number of big bucks would have had to almost double over the same period to give today's hunter the same opportunity he had 36 years ago! Because most of our deer herds are already near or at the carrying capacity of the habitat, attempting to double the number of big bucks is simply not feasible. The only *sure* way to maintain the

same big buck/hunter ratio earlier hunters enjoyed is to limit hunter numbers.

The Hunter's Odds

Department biologists analyzed the opportunity for harvesting a big mule deer buck in each hunting district based on check station data, population surveys, and experience. Their analysis shows that 124 (61%) of the state's deer hunting districts present an excellent opportunity, while another 58 (28%) show moderate opportunity. Only 23 (11%) hunting districts have a poor opportunity of harvesting a big buck. These figures are for mule deer only, and some hunting districts that do not support large populations of mule deer do provide excellent big whitetail buck hunting.

In general, a hunter's opportunity to bag a big buck is directly related to the amount of effort he or she is willing to expend—a serious trophy hunter must expect to hunt fairly inaccessible terrain. Fifty-eight percent of the state's hunting districts offer at least some "backcountry" hunting opportunities (defined as areas at least two miles from the nearest open road).

In the few areas where there are problems with big buck hunting opportunities, further investigation is needed to determine if the causes relate to natural conditions or circumstances that could be affected by adjusting harvest strategies. For reasons discussed previously, some areas may never be capable of producing substantial numbers of big-antlered bucks. Also, little can be done to offset the effects of climatic fluctuations, such as the recent drought, on the availability of big bucks.

MICHAEL H. FRANCIS

The opportunity for bagging a big buck is still good over much of Montana. But because the number of deer hunters has nearly doubled since 1950, the probability of any given hunter taking one has declined.

Big Buck Harvest Strategies

If the number of big bucks in an area can be affected by manipulating the harvest, then special regulations can be implemented to allow more bucks to reach the older age classes. Some possible harvest strategies include limited permits for bucks, minimum antler point rules, a mandatory waiting period after shooting a buck, stratified seasons, quota systems, and limited vehicle access hunts.

Each strategy involves tradeoffs between maximum recreational opportunity and the restrictions necessary to increase the mature buck segment of the population. It must be emphasized that *all* available options will reduce hunter opportunity in one way or another, some more than others. It should also be noted that some strategies may not have the desired effect in certain situations. For example, a minimum four-point rule could actually result in fewer big bucks by shifting hunting pressure from *all* bucks to only four-point or better bucks.

Deer Summary

Our data indicate that there are as many big bucks in Montana now as in the past, and opportunities to harvest a big buck are moderate to excellent in most areas of the state. In areas that have abnormally low buck:doe ratios or lack a normal component of older males, efforts will be made to determine whether this is a recent phenomenon or has always been the case. Some areas may never produce substantial numbers of big bucks, and various conditions may limit the number of big bucks available at any point in time.

As the number of hunters increases, the probability that any individual hunter will take a big buck declines. Harvest strategies designed to produce more big bucks *must* involve restrictions of one kind or another. In the final analysis, the hunting public must decide if such additional limitations on hunting opportunity are an acceptable tradeoff.

Bull Elk in Montana

Montana's elk hunters go afield for many reasons. Certainly, the recreational aspects and the meat are important; a survey done a few years back showed that "the first legal elk seen" was the predominant choice of most hunters. Yet, many hunters feel that Montana's rich elk hunting tradition will be badly compromised if there is little or no opportunity to bag a mature bull.

While the discussion that follows points up some problems with age structure in portions of the elk range, record book statistics bear out the fact that Montana is still a good bet for harvesting a big bull. Of the 73 Montana elk listed in Boone and Crockett, 15 were taken between 1975 and 1984. This has occurred in spite of the fact that elk have been managed in most of Montana primarily for general elk hunting rather than for mature bulls.

MICHAEL H. FRANCIS

The number of elk hunters in Montana has increased more than 30% since the early 1960s, while the number of mature bulls in some areas has declined.

Trends in Elk Hunting Seasons

Elk hunting seasons have become more restrictive over the past 20 years to protect the resource and prevent overharvest. This has become necessary because of increased vehicle access, reduced habitat security, and more hunters. While the past few years have seen record elk harvests—more than 18,000 animals in each of the last two years—the number of hunters has also increased considerably. Since the 1960s, the average elk harvest has increased about 20%, while the number of hunters has increased over 30%.

Montanans still enjoy a five-week general elk season, as they did during the early 1960s, but the *type* of season has changed. In 1963, 67% of the huntable elk habitat in Montana was open to season-long, either-sex hunting. Today, less than 1% is in this category. The area restricted to antlered bull harvest has increased from 21% in 1963 to 58% in 1985. Today we have *branch-antlered* bull requirements in several hunting districts—this was unheard of during the general elk season in 1963. In addition, elk distribution has increased to the point where we now hunt elk on 1.5 million acres more than we did in 1963.

Branch-Antlered Bull Harvest

In the 1960s, about 72% of the elk in the antlered bull harvest were branch-antlered, compared with 47% in the 1980s. However, the average *number* of branch-antlered bulls harvested in the 1980s has increased about 9% compared with the 1960s, reflecting the fact that we now have more elk. In some hunting districts where hunting pressure is high and habitat security low, the number of older bulls has declined considerably. In these areas, more restrictive regulations have been implemented or are being considered.

Long-term data from hunter check stations gives some insights into how the age structure of Montana's bull harvest has changed over the past 15 to 20 years. At the Darby and Bonner Check stations, which monitor the upper Bitterroot and Blackfoot drainages, respectively, the number of six-point and greater bulls has declined by about a third since the late 1960s. However, more six-point or greater bulls have been checked during the last five years than at any time since the early to mid-1970s at these stations. At the Augusta Check Station, which monitors the Sun River country, the number of six-point or greater bulls decreased by 17% between 1972 and 1984. But the Augusta station, too, has seen an increase in big bulls in the 1980s compared with the late 1970s.

At both Darby and Bonner, the number of 3½-year-old and older bulls declined slightly from the late 1960s through the mid-1970s. However, the number has increased again in the 1980s to levels similar to those of the late 1960s. At Augusta, the pattern is similar: The average age of bulls checked through declined from 3.2 years in the late 1960s to 2.3 years in the late 1970s, but has increased again to 3.2 years in the 1980s.

At the Gallatin Check Station north of Yellowstone National Park, the number of older bulls has increased in recent years, but the percentage of older bulls in the bull harvest has declined considerably, as has the average age. Again, while the data show that we have more elk available to the hunter, we have a lower proportion of big bulls.

Opportunity to Harvest Big Bulls

What do these recent population and age structure trends mean to the hunter? At the Darby Check Station during the late 1960s, an average of 41 hunters was checked for every 3½-year-old and older bull checked. During the early 1980s, an average of 168 hunters was checked for every 3½-year-old or older bull. At Bonner, the numbers of hunters per 3½-year-old bull for the same time periods are 63 and 367. As mentioned earlier, the *number* of 3½-year-old and older bulls checked has remained relatively stable at these stations. The number of hunters has increased dramatically.

To gauge the hunter's opportunity to kill a branch-antlered bull, we evaluated the 1982-1984 harvest data for each elk hunting district in the state. Based on the percentage of branch-antlered bulls in the total antlered bull harvest, we placed each elk hunting district in one of the following four "opportunity" categories: 30% or less=poor; 31%-45=fair; 46%-60% good; and over 60%=excellent.

Our analysis showed that the hunter's opportunity to kill a branch-antlered bull is excellent in 21% of today's hunting districts, good in 43%, fair in 28%, and poor in 8%. However, these results must be interpreted with caution when addressing the opportunity for taking a big bull in the 5- to 10-year-old age category. For example, the branch-antlered-bull-only regulation in the Gravelly-Snowcrest area in southwestern Montana has put the hunting districts in this area in the "excellent" category, but most of the branch-antlered bulls harvested are only 2½ to 3½ years old. Before these hunting regulations were implemented, this area would have been in the "poor" opportunity category. In the Gravelly-Snowcrest area, even with the branch-antlered regulation now in effect, bulls are not likely to live more than five years, due to low habitat security and a large number of hunters. To manage this area for older bulls, more restrictive regulations (e.g., permit only for branch-antlered bulls) would have to be initiated.

Future Elk Management

Should it become necessary or desirable to implement more restrictive elk hunting regulations in some areas, a number of options is available. For example, the bull harvest could be restricted to branch-antlered animals only (which is currently done in some areas). This would increase the number of young branch-antlered bulls by protecting the spike bull segment of the population, thus ensuring a good carry-over of yearling animals. The drawbacks to this regulation include the difficulty of maintaining a wide diversity of age classes and, of course, the elimination of the opportunity to hunt spike bull elk.

A more restrictive regulation along the same lines would limit the bull harvest to those with a minimum number of points. This could provide a better diversity of age classes and reduce the pressure on yearling and 2½-year-old bulls, but it might also result in a greater number of illegal kills. Another option would be to make spike bulls legal to all license holders but make branch-antlered bulls legal only by permit. This would unquestionably provide more mature bulls, but would eliminate the opportunity for taking a branch-antlered bull with a general elk license. It would also increase the pressure on spike bulls and increase the potential for illegal harvest of branch-antlered bulls.

A more restrictive "permit" regulation would be to simply make all elk hunting subject to drawing a permit. This would allow the greatest control over harvest of all age classes of elk, but would substantially reduce hunter opportunity. Another idea that has been suggested would involve a mandatory waiting period after killing an antlered bull. However, this would reduce hunter opportunity and require a great deal of record keeping, and it would not be likely to increase the number of branch-antlered bulls.

Elk Summary

The DFWP has maintained a five-week general elk season in Montana for over 20 years, and elk distribution and numbers have increased during that time. However, either-sex elk hunting has been significantly reduced to cope with increasing numbers of hunters, greater access, and reduced habitat security. The state's elk population and elk harvest are now greater than ever, but the number of big bulls available has declined.

While the opportunity to kill a branch-antlered bull is still good over much of Montana's elk range, tradeoffs will be necessary if the number of mature animals is to be increased. Basically, it boils down to a choice between a larger, relatively unrestricted harvest with reduced odds of taking a big bull or a smaller, more restricted harvest with better odds of bagging a big animal.

In some hunting districts, where hunting pressure is high and habitat security low, more restrictive regulations on bull harvest have been implemented in recent years. Several additional innovations are being considered that could provide a greater diversity of opportunity for Montana's elk hunters. Biological considerations and hunter preferences will guide future elk management decisions. ■

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